

INSTRUCTION MANUAL

MOTOROLA

The Research Line



144-174 MC.

10 & 25 W RF POWER

FM TWO-WAY RADIO

6/12 VDC
MOBILE

117 VAC
AC UTILITY



MOTOROLA Communications and Electronics Division
4501 W. Augusta Blvd. • Chicago 51, Illinois

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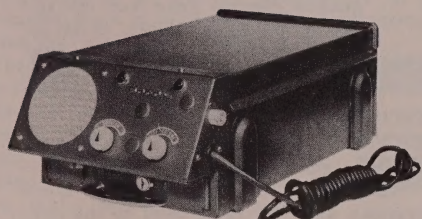
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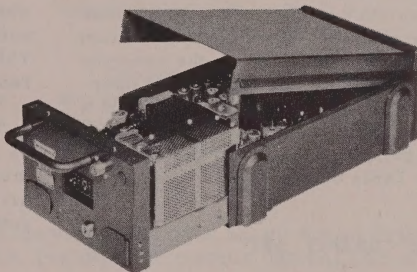
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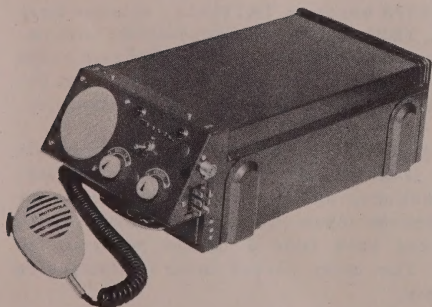


L43GGB SERIES
25 WATT
AC UTILITY



T33GGV & T43GGV SERIES
10 & 25 WATT
TRUNK MOUNT MOBILE

SPEAKER — CONTROL HEAD & MICROPHONE
TRUNK MOUNT MOBILE



D33GGV & D43GGV SERIES
10 & 25 WATT
FRONT MOUNT MOBILE

DESCRIPTION

INSTALLATION
& OPERATION

RECEIVER

TRANSMITTER

POWER SUPPLY

CONTROL HEAD

CONTROL PANEL



MOTOROLA COMMUNICATIONS AND ELECTRONICS DIVISION

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4501 W. Augusta Blvd.

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FOREWORD

PURPOSE OF THE MANUAL

This manual offers the serviceman complete installation, operation, maintenance and service information on the MOTOROLA 2-way radio models contained in it.

The manual will serve not only as a ready reference for the experienced technician, but also as a step-by-step guide for the inexperienced man.

For convenience and quick reference, the manual is divided into separate sections. Each section has complete alignment, service and maintenance information on its chassis and/or kits and includes its own diagrams, details and parts lists. For example, the Receiver section contains complete information on the receiver models contained within it. Installation and operation of the complete radio set are covered in a separate section. All major section paragraph headings and diagrams are listed for the serviceman's use in the Table of Contents.

THE "RADIO SET"

MOTOROLA 2-way radio equipment is packaged as a radio set plus accessories. The radio set is assigned a model number for identification purposes. It includes the transmitter, receiver, and power supply chassis in a single housing. This model number describes the package specifically. Use the model number in its entirety when making inquiries about the equipment.

Example: T43GGV-1 - describes a trunk mount, 144-174 mc, 60 kc channel spaced set with a 25 watt, one frequency transmitter, and a vibrator power supply.

It is evident that the model number is easier to use and is more specific than a word description.

The accessories are identified by an accessory group number which includes those other items essential to completing the radio installation such as; antenna, speaker, cables, etc. Use

this number when referring to a specific group of accessories.

Example: L2A - describes an accessory group which includes a one-frequency control head and microphone, 6VDC cable kit, installation kit for a 10-inch trunk mount housing, roof top antenna, and a speaker.

In addition to these model and group numbers, Motorola has assigned identifiers to all chassis and kits. These are for inventory and stock control purposes and should be used by the serviceman when requesting information on them or when ordering replacements. Use the assigned number identifiers. It will be to your benefit. These are the only sure means of describing the radio equipment and its many parts.

The radio set model number is metal stamped on the equipment nameplate along with the transmitter type number, serial number and type of primary power. Chassis and kit numbers are rubber stamped on the chassis or kit itself.

For the serviceman's use, breakdown cross reference charts on radio set models and accessory groups are located in the front matter section of the manual.

PRODUCTION CHANGES

When production and engineering changes are incorporated into the equipment, a revision numeral is assigned to the chassis or kit affected, e.g.; TA139A becomes TA139A-1, with the first revision. This chassis number complete with revision numeral is stamped on the chassis at the time of production, and the revision numeral becomes an integral part of the chassis identifier.

A schematic diagram number complete with its issue letter is also stamped on each chassis. This establishes direct correlation between the chassis and its schematic. The schematic issue is advanced each time a change occurs in the chassis. The most recent issue is stamped on the chassis.

INSTRUCTION MANUAL REVISION BULLETINS

Those changes which occur after an instruction manual is printed are covered by the Instruction Manual Revision Bulletins. These bulletins give the reader complete information on the change including pertinent parts listing data from which the instruction manual can be corrected.

NATIONAL SERVICE ORGANIZATION

Motorola provides a nation-wide, service organization to assure availability of reliable maintenance at all times. These privately-owned and operated factory authorized service stations are equipped and qualified to handle complete installation of all Motorola two-way radio equipment. They are also equipped and licensed to make the frequency and modulation measurements required by the FCC. Each station has the precision test equipment, stocks of replacement parts, and shop facilities necessary to maintain your system to factory specifications. Call on them for complete maintenance service! Consult your local telephone directory for the address of the nearest Motorola Service Station, or write to:



National Service Manager
Motorola Communications and Electronics Inc.
4501 W. Augusta Boulevard
Chicago 51, Illinois

REPLACEMENT PARTS ORDERING

Motorola also maintains three replacement parts depots. Use the depot nearest you for replacement parts or service information:

- 1414 N. Cicero Avenue, Chicago 51, Illinois
- 171 Parkhouse Street, Dallas 7, Texas
- 811 South "B" Street, San Mateo, California

They are fully equipped to give this service. When ordering replacement parts, the complete number identification of the item must be used whether it be a component, kit or complete chassis. This will fix proper identification and insure receipt of the desired item. Complete number identification should also be used when requesting equipment information.

Crystal orders should contain crystal type number, crystal frequency and carrier frequency. Also include the chassis number in which the crystal is to be used.

CAREFUL USE OF THE INSTRUCTION MANUAL AND THE MANY SUGGESTIONS CONTAINED IN IT WILL FURTHER INSURE PROPERLY INSTALLED AND MAINTAINED RADIO EQUIPMENT.

THE EQUIPMENT DESCRIBED IN THIS MANUAL IS MANUFACTURED UNDER ONE OR MORE OF THE FOLLOWING MOTOROLA U. S. PATENTS:

D-159, 182	2, 439, 408	2, 343, 115	2, 664, 554	2, 404, 359
2, 524, 534	2, 459, 675	2, 409, 139	2, 547, 025	2, 439, 412
2, 547, 027	2, 547, 023	2, 472, 021	2, 572, 900	2, 524, 300
2, 583, 032	2, 560, 320	2, 547, 024	2, 602, 842	2, 547, 026
2, 607, 818	2, 608, 648	2, 566, 759	2, 626, 384	2, 636, 652
2, 637, 782	2, 662, 942	2, 608, 649	2, 652, 542	2, 652, 543
2, 691, 560	2, 705, 281	2, 650, 333	2, 688, 059	2, 691, 094

Other U. S. Patents Pending

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MOTOROLA

CROSS REFERENCE CHART

144-174 MC.

RADIO SETS

6/12 VDC VIBRATOR MODELS

117 VAC UTILITY MODELS

CODE

- ☒ = ITEMS INCLUDED WITH RADIO SET.
☒ = TWO ITEMS INCLUDED WITH RADIO.
☒ = ONE ITEM SUPPLIED WITH FIVE OR LESS RADIO SETS.

MOTOROLA					REFERENCE DIAGRAM	
CROSS REFERENCE CHART						
144-174 MC. RADIO SETS						
6/12 VDC VIBRATOR MODELS 117 VAC UTILITY MODELS						
CODE						
☒ = ITEMS INCLUDED WITH RADIO SET.						
☐ = TWO ITEMS INCLUDED WITH RADIO.						
☑ = ONE ITEM SUPPLIED WITH FIVE OR LESS RADIO SETS.						
MODEL	DESCRIPTION	ACCESSORY GROUP	BASIC UNIT	DESCRIPTION	REFERENCE DIAGRAM	
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D33GGV-1	1-FREQ XMTR, 1-FREQ RCVR W/60 KC CHANNEL SPACING	K	TA139A-C2	TRANSMITTER, 1-FREQ 25 WATTS, 6/12 VOLT FIL. 144-174 MC.	63E8 9269	
D33GGV-2	2-FREQ XMTR, 1-FREQ RCVR W/60 KC CHANNEL SPACING	K	TA139B-W	TRANSMITTER, 2-FREQ 25 WATTS, 6/12 VOLT FIL. 144-174 MC.	63E8 9269	
D33GGV-3	1-FREQ XMTR, 1-FREQ RCVR W/60 KC CHANNEL SPACING	K	TA140B-W R2	RECEIVER, 1-FREQ WITH TU145 FILTER, 6/12 VOLT FIL. 144-174 MC.	63E8 9269	
25 WATT FRONT MOUNT MODELS						
D43GGV-1	1-FREQ XMTR, 1-FREQ RCVR W/60 KC CHANNEL SPACING	K	TA140B-W R2	RECEIVER, 1-FREQ WITH TU145 FILTER, 6/12 VOLT FIL. 144-174 MC.	63E8 9269	
D43GGV-2	1-FREQ XMTR, 1-FREQ RCVR W/120 KC CHANNEL SPACING	K	TA140B-X R2	RECEIVER, 1-FREQ WITH K-3242 FILTER, 6/12 VOLT FIL. 144-174 MC.	63E8 9269	
10 WATT TRUNK MOUNT MODELS						
D43GGV-5	2-FREQ XMTR, 2-FREQ RCVR W/120 KC CHANNEL SPACING	K	TU117-F	POWER SUPPLY, VIBRATOR TYPE, TRUNK MOUNT, 25 WATTS, 6/12 VDC	63D8 1716	
D43GGV-6	1-FREQ XMTR, 1-FREQ RCVR W/60 KC CHANNEL SPACING	K	TU189	POWER SUPPLY, AC TYPE, 25 WATTS, 117 VOLTS	63D8 1529	
D43GGV-8	1-FREQ XMTR, 1-FREQ RCVR W/60 KC CHANNEL SPACING	K	TU212	POWER SUPPLY, VIBRATOR TYPE, TRUNK MOUNT, 10 WATTS, 6/12 VDC	63D8 1529	
T33GGV-1	1-FREQ XMTR, 1-FREQ RCVR W/60 KC CHANNEL SPACING	L	TU212-F	POWER SUPPLY, VIBRATOR TYPE, TRUNK MOUNT, 10 WATTS, 6/12 VDC	63D8 1529	
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EPD-290-CP

DESCRIPTION

1. INTRODUCTION

MOTOROLA "RESEARCH" Line of 144-174 mc. FM radio equipment consists basically of a "radio set" and an associated "accessory group". The "radio set" is comprised of a transmitter, receiver and power supply chassis assembled in a drawer type housing. An "accessory group" includes all associated items required to complete a standard installation of the radio equipment.

"Radio Set" model variations are dependent upon transmitter power output, degree of receiver selectivity, number of operating channels, primary power source, and the type of installation required (AC utility, front mount, trunk mount). Refer to the "radio set" model chart at the beginning of this manual for a complete listing of the standard "radio sets" available and their respective applications.

Various "accessory groups" are established for use with mobile radio models. The particular combination to be employed will depend upon specific customer requirements. Variations in "accessory groups" are based on primary power source, number of operating channels, type of installation (front mount or trunk mount), and required accessory complement (omission or inclusion of various items).

All MOTOROLA lines of 144-174 mc. FM radio equipment provide dependable two-way communications with land and/or mobile stations operating within range on the same specific frequencies.

2. DESIGN

The D33GGV & D43GGV Series Front Mount Models are designed primarily for under the dash installation. These units provide a transmitter power output of 10 or 25 watts respectively and

utilize a 10" width mobile housing. D33GGV & D43GGV "radio sets" may be operated from either a 6 or 12 VDC primary power source depending only upon the cable kit used with the equipment.

The L43GGB Series Models are intended for AC utility, desk top applications. These models are identical to the D43GGV Series Models except for unique power supply and cabling provisions to permit operation from a 117 VAC - 60 cycle power source.

The T33GGV & T43GGV Series mobile equipment is designed for trunk mount vehicular installation. These units provide a transmitter power output of 10 or 25 watts respectively and utilize a 10" width mobile housing. The equipment may be operated from either a 6 or 12 VDC primary power source depending only upon the cable kit used with the equipment.

3. EQUIPMENT COMPLEMENT

a. Radio Set

A standard "radio set" model is comprised of the following basic items:

- Transmitter Chassis
- Receiver Chassis
- Power Supply
- Housing
- Sub-Panel and Intercabling Kit
- Front Panel (trunk mount models only)
- Control Panel (front mount & AC utility models only)
- Transmitter Control Crystal(s)
- Receiver Control Crystal(s)
- Receiver IF Crystal
- Alignment Tool Kit

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b. Accessory Group

A standard accessory group includes a specific combination of the following items:

(1) Front Mount Accessories

Antenna
Installation Kit
Cable Kit

(2) Rear Mount Accessories

Control Head
Cable Kit
Installation Kit
Speaker
Antenna

NOTE

There are no accessories for AC Utility Model Stations.

4. DESCRIPTION OF RADIO SET COMPONENTS

a. Transmitter Chassis

The MOTOROLA "RESEARCH" Line transmitter chassis are available in one or two channel versions. The transmitters operate in the 144 - 174 mc. band. Any transmitter may be used for either 60 kc. or 120 kc. channel spacing applications with the same adjustment of the IDC control to meet either channel width requirement.

All mobile and AC utility stations described in this manual utilize a transmitter of the TA139A Series.

Refer to the TRANSMITTER section for complete specifications and service information relative to the various transmitters used with this equipment.

b. Receiver Chassis

MOTOROLA Model TA140B Series 144-174 Mc. Universal UNI-CHANNEL receiver chassis are available in either one or two channel versions. With incorporation of different IF wave filters, the same basic receiver chassis is used for either 30, 60 or 120 kc. channel spacing applications. Model nomenclature for different receiver versions is distinguished by unique suffix letters. All mobile and AC utility stations described in this manual utilize a receiver of the TA140B Series.

Refer to the RECEIVER section of this manual for detailed specifications and service information relative to these receivers.

c. Power Supplies

Three different basic type power supplies are employed with this radio equipment. The TU117 Series models are "all-vibrator" type power supplies. This type supplies operation from a standard vehicular battery source. The TU189 is an AC operated selenium rectifier type power supply.

The TU117 Series Power Supplies are designed to operate from either a 6 VDC or 12 VDC primary power source depending upon the cable kit used with the equipment. These supplies are used in conjunction with 25 watt transmitters.

The TU212 Series Power Supplies are designed to operate from either a 6 VDC or 12 VDC primary power source depending upon the cable kit used with the equipment. These supplies are used in conjunction with 10 watt transmitters.

The TU189 Power Supply is designed to operate from a 117 VAC - 60 cycle primary power source and is used in conjunction with a 25 watt transmitter (used on L43GGB AC utility model).

These MOTOROLA heavy duty type power supplies provide all operating voltages for the transmitter, receiver and control circuits of the radio combination with which they are used.

Refer to the POWER SUPPLY section of this manual for detailed specifications and service information.

d. Equipment Housings

The K-9045 Housing measures approximately 9-5/8" wide by 18" deep by 6" high overall. This housing is used with all models and constructed of heavy gauge steel, finished in dark gray automotive type baked enamel. The housing features a removable cover permitting easy access to the inner drawer unit for added convenience in inspecting and servicing of the equipment.

NOTE

For convenience, the K-9045 Housing is referred to as the "10 inch" housing throughout this text.

e. Front Panels (Trunk Mount Installations Only)

The K-9029-A Front Panel is employed with the K-9045 "10 inch" Housing. This unit is assembled to associated sub-panels to constitute the exterior front panel for the drawer type units. The panel serves also as the front end cover for the mobile housing. A key lock is provided on the panel to lock the drawer units in the housing. A handle is also mounted on the panel for convenience in removing the equipment from the housing and for carrying purposes.

f. Sub-Panel and Intercabling Kits

The TK163 Sub-Panel and Intercabling Kit is employed with the K-9045 "10 inch" Housing. The sub-panels included in this kit is used to assemble the transmitter, receiver and power supply together for installation in the equipment housing. In conjunction with the associated front panel, the assembled combination will constitute the drawer type unit for the housing assembly. The antenna interconnect cables and connectors are also included with this kit. Cable receptacles for connection of external cables are assembled to the front sub-panel.

g. Control Panel

The control panel is an integral part of the chassis assembly for the front mount and AC utility versions of the Universal UNI-CHANNEL equipment. The panel is physically assembled to the front of the "10 inch" equipment housing and provides all operating facilities for control of the radio assembly. Control panels are available in one or two-frequency versions, with or without an attached microphone. Panels supplied less microphone include a four prong female receptacle for connection of an external microphone or handset (see optional accessories).

The TU190 Series (with microphone) and TU206 (with microphone connector) Control Panels are designed for use with front mount mobile equipment. The TU207 Series (with microphone) and TU208 (with microphone connector) Control Panels are designed for use with AC utility model equipment.

All above named control panels employ a DC type volume control.

The TU238 Series (with microphone connector and connections for QUIK-CALL application) is designed for front mount mobile equipment. The TU239 Series (with microphone connector and

connections for QUIK-CALL application) is designed for use with AC utility model equipment. These two above named series employ a speaker "L" pad control.

Refer to the CONTROL PANEL section of this manual for complete information relative to these control panels.

h. Crystals

The DS1 is the frequency control element for all transmitter units. All transmitter control crystals are available for 144-174 mc. frequency operation.

DM10 Series Crystals are the primary frequency control elements for the receivers used in this equipment. The G03 is the IF crystal for all applications of the receiver.

The control crystals are available for any specific frequency in the 144-174 megacycle band.

These crystals are not part of the transmitter or receiver chassis but are separate items of the overall Radio Set models. When ordering a complete model or individual chassis, crystal type numbers and operating frequency must be specified.

i. Cable Clamp Kit

A K-8618 Cable Clamp Kit is supplied with all 60 watt type trunk mount "radio set" models. This kit includes two cable clamps which are used to secure transmitter and receiver cables within the drawer assembly.

j. Tuning Tool Kit

The K-9321 Tuning Tool Kit includes MOTOROLA Part Number 66A891487 and 66A835721 Alignment Tools. The 66A891487 Tool is used for transmitter alignment. The 66A835721 is used for alignment of the receiver. Refer to the Alignment Tool Detail 69C801349 for specific dimensions of these alignment tools.

5. DESCRIPTION OF STANDARD ACCESSORIES

a. Control Heads and Microphones

The control head provides the control facilities necessary to manually operate the trunk mount mobile station radio equipment from a

dash board location. Various model control heads, with and without a microphone, are available.

Refer to the CONTROL HEAD and MICROPHONE section of this instruction manual for application of the various control heads available and other relative service information regarding these units.

b. Loudspeaker

Standard trunk mount mobile accessories include a TU324A Firewall Mounting Speaker. This unit includes a 4-1/2" diameter, 3 ohm permanent magnet speaker, mounted in a metal housing. An 8 foot speaker lead is provided for connection to the control head.

Refer to the installation instructions supplied with the speaker for complete installation details.

c. Cable Kits

The cable kit supplied with any accessory group includes the external cables and power fuses(s) necessary for installation of a particular mobile "radio set" model. For Trunk Mount installations, an "A" power relay is also provided with the cable kit. Different types of cable kits are used with various "radio set" models depending upon the number of frequencies used, transmitter power output, primary power source, and the application of the equipment. The standard cable kits available and their respective applications are as follows:

- (1) TK208: Used with 1-Freq.; 25 watt, trunk mount mobile models to operate from a 6.3 VDC power source.
- (2) TK209: Used with 1-Freq.; 25 watt, trunk mount mobile models to operate from a 12.6 VDC power source.
- (3) TK161: Used with 2-Freq.; 25 watt, trunk mount mobile models to operate from a 6.3 VDC power source.
- (4) TK162: Used with 2-Freq.; 25 watt, trunk mount mobile models to operate from a 12.6 VDC power source.

(5) TK190: Used with 1 or 2-Freq.; 25 watt, front mount mobile models to operate from a 6.3 VDC power source.

(6) TK191: Used with 1 or 2-Freq.; 25 watt, front mount mobile models to operate from a 12.6 VDC power source.

d. Installation Kits

The K-9054 Installation Kit is supplied with all Model D33GGV & D43GGV Series front mount mobile equipment. The K-9055 Installation Kit is supplied with T33GGV & T43GGV Trunk mount mobile units. These kits include a noise suppressor, by-pass capacitors, cable clamps and mounting hardware for installation of applicable "radio set" models.

e. Antenna

The TU316 Roof Top Antenna includes a quarter wavelength stainless steel rod with associated 14 foot coaxial "lead-in" cable. The unit is expressly designed for standard vehicle roof top installation. The antenna is used with both front and trunk mount mobile equipment. Complete installation instructions for this antenna are included with the antenna.

6. OPTIONAL ACCESSORIES

a. P-8501-A Portable Test Set

The MOTOROLA P-8501-A Portable Test Set is a universal test instrument for alignment of transmitters and receivers. It is engineered specifically for use with MOTOROLA "RESEARCH" Line communication equipment. With the adapter cables supplied, the P-8501-A Test Set may be used to align all MOTOROLA transmitters and receivers.

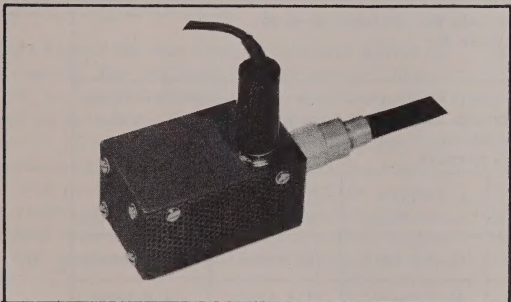
The test set incorporates a 0-50 microampere 2000 ohm meter which, with the selector switch, provides metering for all transmitter and receiver circuits essential to tuning and checking. Also included in the test set is a crystal oscillator and multiplier. With the aid of an associated transmitter crystal and applicable IF crystal the test oscillator may be used as a signal source for complete receiver alignment. The test set may also be used as a field strength meter for measurement of relative transmitter field strength.



P-8501-A PORTABLE TEST SET

Other functions which may be performed with the test set are relative audiomeasurement receiver quieting measurement, and transmitter filament and plate voltage measurement.

b. P-7208 Wattmeter Load



P-7208 WATTMETER LOAD

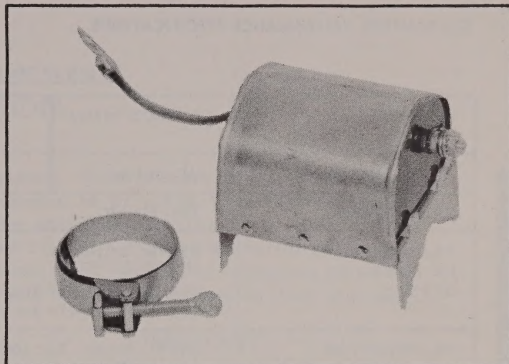
The P-7208 Wattmeter Load is designed to be used with a P-8501-A Test Set or other 2000 ohms, 0-50 microampere meter to measure RF power output. The unit has a standing wave ratio of less than 1.2 over a frequency range of 25-174 mc. and a nominal impedance of 50 ohms. A calibration chart is supplied for use in correlating power dissipated in the load and the meter reading.

c. P-7234 Series Cowl Mounted Antenna

The P-7234 Series Cowl Mounted Antenna is available on special order if desired. The P-7234 Series Antenna may be ordered in either the

sectional rod or solid rod styles. Operating frequency must be specified when ordering this type antenna.

d. P-346 Generator Filter



P-346 GENERATOR FILTER

The P-346 Generator Filter is intended for mobile units equipped with VHF receivers to eliminate generator interference. The filter is rated at 40 amperes.

e. K-7257 Extension Cable

A K-7257 Extension Cable is available for use with the mobile trunk mount equipment. This cable may be used to provide a direct ground return from the mobile housing assembly to the vehicular battery. The cable is 17' in length.

f. Long Cable Kits

Specific cable kits are available featuring 20' power and control cables instead of the standard 17' length for all trunk mount models. These cable kits are applicable for limousine or truck type installations. These cable kits are interchangeable with standard cable kits of corresponding application.

g. Detachable Microphone and Handset

A TU343 Military Type Microphone and P-278-F Handset are available for use with control units incorporating the microphone connector. All are terminated in a four-prong male connector.

The TU343 is a standard MOTOROLA military type microphone, the P-7255-A is a "noise cancelling" type microphone and the P-278-F is a telephone type handset.

Before installing either the microphone or handset, check the audio level adjustment located in the input circuit of the audio amplifier stage of the transmitter. It will be seen that the microphones and handset require different input levels.

Refer to the transmitter schematic diagram, 63E836043, for proper connections. If the microphone or handset is ordered with the "radio set", the proper connection is made at the factory.

GUARANTEED PERFORMANCE SPECIFICATIONS

10 and 25 Watt Station Models

MODELS		L43GGB Series	D43GGV Series D33GGV Series		T43GGV Series T33GGV Series	
APPLICATION		AC Utility	Front Mount Mobile		Trunk Mount Mobile	
FREQUENCY		144-174 MC.				
TRANSMITTER RF POWER OUTPUT		25 Watt Station 25 Watts (144-167 Mc.) 20 Watts (167-174 Mc.)		10 Watt Station D33GGV and T33GGV only 10 Watts (144-174 Mc.)		
TRANSMITTER MODULATION		40F3: ± 15 Kc. for 100% at 1000 cycles				
RECEIVER 20 DB. QUIETING SENSITIVITY		With K-9240 Filter (30 Kc. channel spacing): less than 0.6 microvolts. With TU145 Filter (60 Kc. channel spacing): less than 0.6 microvolts. With K-9242 Filter (120 Kc. channel spacing): less than 0.6 microvolts.				
RECEIVER SELECTIVITY		With K-9240 Filter: -100 db. at ± 18 Kc. With TU145 Filter: -100 db. at ± 32 Kc. With K-9242 Filter: -100 db. at ± 120 Kc.				
RECEIVER MODULATION ACCEPTANCE		With TU145 or K-9242 Filter: ± 15 Kc. or more at -6 db. With K-9042 Filter: ± 5 Kc. at -6 db.				
METERING		Chassis mounted metering sockets on the transmitter and receiver facilitate convenient metering of all circuits essential to tuning and checking. A test unit incorporating a single scale meter and associated rotary selector switches may be used for this purpose.				
POWER INPUT (TOTAL)	Input V	117 VAC	6.3 VDC for 25 Watts	6.3 VDC for 10 Watts	12.6 VDC for 10 Watts	12.6 VDC for 25 Watts
	Standby	73 Watts	11.0 Amps.	11.0 Amps	5.8 Amps.	6.0 Amps.
	Transmit	170 Watts	32.0 Amps.	24.5 Amps.	13.5 Amps.	17.0 Amps.
	Intermit. Drain	Each Crystal Heater: 5 Watts or 0.8 Amps.				
POWER SUPPLY		AC Type	Single Vibrator Type			
WEIGHT		54 lbs.	46 lbs.			
DIMENSIONS		6" high x 9-7/8" wide x 18-1/2" long overall	6" high x 9-7/8" wide x 18-1/4" long overall			
FCC LICENSE DESIGNATION		All Models: TA139A				

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

INSTALLATION AND OPERATION

INSTALLATION

1. PRELIMINARY

a. Unpacking and Inspection

Use care when unpacking and handling this radio equipment. Open the shipping carton and carefully remove the individually packaged components. Check contents to be sure all items have been included.

Inspect the equipment thoroughly as soon as possible after delivery. If any part of the equipment has been damaged in transit, report the extent of damage to the transportation company immediately.

b. Pre-Installation Check

This equipment has been accurately adjusted at the factory for optimum performance. However, it is possible that units may have been dropped or otherwise severely mishandled while in transit. Therefore, previous to making the installation, it is recommended that the transmitter and receiver be bench checked for proper meter readings. If these preliminary checks indicate that any of the circuits are out of alignment, the entire unit should be completely realigned.

If re-alignment is necessary, refer to the applicable procedure in the TRANSMITTER and RECEIVER section of this manual.

NOTE

FCC regulations state that when a transmitter is initially installed, a suitable procedure shall be employed to ascertain that the carrier is on the assigned frequency.

This frequency check is recommended to be made immediately before the equipment is placed in service. A MOTOROLA F4MU-24B Series Frequency Monitor or equivalent frequency measuring device should be used for this purpose.

IMPORTANT

F.C.C. regulations state that a radio transmitter may be tuned or adjusted only by a radio operator holding a duly authorized Radiotelephone License of applicable class or by personnel working under direct supervision of the same.

2. MOBILE TRUNK MOUNTING INSTALLATION PROCEDURE

a. Planning the Installation

A typical trunk mount mobile installation is illustrated on Diagram 69D802254. Cabling Details are shown on Diagrams 69C831702 and 69C835232. When any optional accessories are used in conjunction with the mobile equipment refer to the instructions included with the specific accessories for installation details.

Before proceeding with the actual installation, a definite layout outlining the exact location for each component of the equipment should be made. Locations should be selected with regards to the following considerations.

When a ground connection is made to the frame or body of the vehicle, scrape off all existing paint and clean the surface at the connection point. Use steelwool or a similar material to burnish the surface.

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Engineering Publications 4501 W. Augusta Blvd. Chicago 51, Illinois

(1) Convenient location of the mobile housing assembly. The unit must be well grounded to the vehicle frame. This plan should provide a location for the mobile housing which will permit removal of the chassis from the housing and be as much out of the way for luggage in the trunk as possible.

(2) Convenient location for mounting the antenna. The antenna lead-in must be routed so as to avoid any sharp bends and undue strain at either end connector.

(3) Convenient locations for mounting the speaker, control head and microphone or handset.

(4) Convenient route for running interconnecting cables.

(5) Convenient location for fuse block and "A" power relay.

NOTE

The dual interrupter vibrators employed with these mobile station models, permit standard installation regardless of which terminal of the vehicle battery is grounded.

b. Mobile Housing Installation

(1) Position

The mobile housing may be installed in various positions depending upon the individual application; however, inverted mounting is not recommended.

(2) Mounting the K-9045 (10" housing).

Refer to Dimensional Detail 69B802109 for clearance allowance.

(a) Remove the drawer unit and top cover from the housing.

(b) Knock out the four half-punched mounting holes in the bottom of the housing.

(c) Place the housing in the desired mounting location. The location should be flat and free from projections.

(d) Use the housing as a template or refer to Dimensional Detail 69B802109. Allow a minimum clear space of three inches in front of the housing and center punch the four mounting centers.

CAUTION

Use extreme care when drilling mounting holes so as not to penetrate gas line or gas tank. Check the space between trunk floor and gas line or tank to see that the mounting screws (when tightened down) will not pierce line or tank.

(e) Use a #11 (.191") drill to drill the mounting holes. Use caution; the drill must clear the gas tank, wiring, and other vital parts.

(f) Mount the housing to the vehicle using the four #14 sheet metal screws supplied in the installation kit.

c. Mounting Control Head

The control head may be installed in any desired location, preferably on the lower lip of the instrument panel of the vehicle. The unit may be mounted in any of several positions as desired.

(1) Pre-Installation Instructions

To facilitate installation, the control head assembly is shipped with the mounting bracket dis-assembled from the control unit. When installing the unit, first mount the bracket and then assemble the control head to the bracket.

Any combination of the five mounting holes provided in the mounting bracket may be utilized for the installation - depending upon the physical configuration, wiring layout, etc. of the instrument panel. When two mounting holes are used (minimum required), the extreme end holes of the bracket should be employed.

(2) Install the Control Head

CAUTION

Be sure that all wires are clear of the instrument panel where holes are to be drilled.

(a) Select a location for the control head. Use the mounting bracket as a template to determine placement of the mounting holes. Use a 1/8 drill and drill 0.125" diameter holes.

(b) Mount the control head mounting bracket with the desired number of #8 sheet metal screws supplied (two screws minimum).

(c) Assemble the control head to the control head mounting bracket. Be sure to place the bakelite washers between the mounting bracket and the control head housing.

(d) Tighten the screws securely.

(3) Pilot Lamp Considerations

All control heads are shipped with 6 volts lamps installed. For 12 volt operation replace only the green lamp (12 volt lamp supplied with applicable 12 volt cable kit).

d. Mounting Microphone Bracket

(1) Select a location for the microphone and drill two holes 0.125" in diameter (1/8 drill), 1/2" apart, or use the bracket as a template.

(2) Fasten the bracket with the two #8 self-tapping screws.

NOTE

If a handset is used, use the hang-up bracket as a template, drill holes with 1/8 drill, and mount with the hardware supplied.

e. Mounting Speaker

Refer to installation instructions supplied with the speaker.

f. Fuse Block Assembly and "A" Power Relay Mounting

The fuse block assembly and the "A" power relay are mounted on the engine side of the firewall or on the fender panel. The fuse block must be within 24 inch cable length of the battery or hot connection on starter relay.

In installations where the fuse block is exposed to severe weather conditions, it is recommended that it be mounted on the dash side of the firewall.

(1) Fuse Block Assembly Mounting

NOTE

Remove the fuse from the fuse block and DO NOT replace until the entire installation is completed.

(a) Select the desired location for the fuse block assembly.

(b) Use the Fuse Block gasket as a template and center punch 2 mounting centers.

(c) Drill two 0.140" diameter mounting holes using a 9/64 twist drill.

(d) Mount the fuse block assembly to the fender panel or firewall with the 2 #10-16 x 3/4" sheet metal screws supplied.

(2) Installation of "A" Power Relay

Install the relay within three feet of the fuse block. Position the relay so that the mounting bracket is "up" and the terminals are "down".

(a) Use the mounting holes in the relay mounting bracket as a template and drill two 0.203" mounting holes with a 13/64 drill.

(b) Fasten the relay securely using the two #14 sheet metal screws supplied.

g. Interconnecting

Refer to Interconnecting Diagram 63E831705 and Cabling Detail 69C831702 for external wiring of Model T43GGV Series mobile station equipment (10" housing).

(1) Connect the power and control cable connector(s) into the receptacle(s) on the front of the mobile housing assembly.

(2) Route the 17' control cable thru the forward wall of the trunk and along either side of the vehicle so that the pin tip ends of the control cable reach to the terminal board on the rear of the control head. The cable may be routed under the floor mat along the side of the center drive shaft well if desired.

Protect the cable with rubber grommets or electrical tape at the points where it may be necessary to run the cable thru holes in the car frame or over steel seat guides.

(3) Secure the control cable clamp to the plate on the rear of the control head by means by the "S" hook on the cable.

(4) Insert the control cable pin tab connectors into the corresponding receptacles on the rear of the control head.

(5) Ground the control cable shield lead under the control head assembly screw adjacent to receptacle #33 on the rear of the control head.

(6) Clamp the control cable down wherever necessary with the cable clamps and hardware supplied. Pull any excess cable into the trunk compartment before tightening the cable clamps.

(7) Connect the speaker leads to the SPKR receptacles on the rear of the control head.

(8) Route the 17' Power Cable to the "A" power relay.

(a) Interior Routing

The 17' Power Cable is preferably routed through the interior of the vehicle along with the control cable, thus eliminating the necessity of weatherproofing the cable. In such installations a hole may have to be drilled in the firewall permitting routing of the power cable to the "A" power relay.

(b) Exterior Routing

The 17' Power Cable may be routed under the vehicle if desired. However, in such installations weatherproofing will be required. To route cable beneath vehicle proceed as follows:

CAUTION

Placement of this hole should be clear of the vehicle fuel tank.

1. Drill a hole in the floor of the trunk large enough to accommodate the power cable.

2. Route the weatherproofed cable through the hole in the trunk and along the frame of the vehicle to the "A" power relay. Cables routed under the vehicle should employ "flexible loom" or other suitable protection.

3. Seal the hole around the protected cable with a rubber grommet or by other means in order to prevent water seepage into the trunk.

(9) Connections to the "A" power relay differ depending upon the type of control head used for a particular installation:

(a) Installation with TU124 or TU203 Control Head:

1. Connect the 17' Power Cable to the "H" terminal of the "A" power relay.

2. Connect one end of the 3' Power Cable to the fuse block and the other end to the "B" terminal of the "A" power relay.

3. Connect the 4" BLK jumper from the "B" terminal to one of the "S" terminals of the "A" power relay.

4. Insert the pin tip connectors on the ends of GRN and GRN-WHT leads into the #6 and #5 pin receptacles respectively on the control head terminal board.

5. Route the GRN and the GRN-WHT leads to the "A" power relay from the control head. These cables should be routed through the firewall panel in as convenient and direct a manner as possible.

6. Connect the lug end of the GRN lead to the "H" terminal of the "A" power relay. Connect the lug end of the GRN-WHT cable to the vacant "S" terminal of the "A" power relay.

(b) Installation with TU287 or TU288 Control Head:

1. Connect the 17' Power Cable to the "H" terminal of the "A" power relay.

2. Connect one end of the 3' Power Cable to the fuse block and the other end to the "B" terminal of the "A" power relay.

3. Insert the pin tip connectors on the ends of GRN and GRN-WHT leads into the #6 and #5 pin receptacles respectively on the control head terminal board.

4. Route the GRN and the GRN-WHT leads to the "A" power relay from the control head. These cables should be routed through the firewall panel in as convenient and direct a manner as possible.

5. Connect the lug end of the GRN lead to the "S" terminal of the "A" power relay. Connect the lug end of the GRN-WHT lead to the "B" terminal of the "A" power relay.

NOTE

The following steps apply for installation with either type of control head.

6. Connect one end of the 4" BLK jumper to the vacant "S" terminal on the "A" power relay and insert the other lug end under one of the "A" relay mounting screws. Tighten securely.

(10) Ground the 4' ground cable from the mobile housing power plug to the chassis frame (utilize convenient frame bolt).

IMPORTANT

A secure ground connection to the vehicle frame is required for proper operation.

NOTE

The K-7257 17' Ground Extension Cable is available on separate order. This cable is installed between 4' ground cable from the power plug and the retaining bolt of the ground cable connector on the battery ground terminal. The 4' ground cable should be assembled to the extension cable with a bolt and nut connection. This ground return extension cable to the battery is recommended for use in over-age vehicles in which excessive voltage drops are encountered.

(11) Connect the 24" battery cable from the open end of the fuse block to the ungrounded (hot) battery or starter solenoid terminal. Fasten the cable lug beneath the nut on the battery clamp or starter solenoid terminal.

(12) Fasten down all cables wherever necessary with cable clamps and hardware supplied. Pull all cable excess into the trunk compartment before tightening cable clamps.

(13) Replace the fuse in the fuse block.

h. Antenna and Suppressor Installation

Install the antenna as outlined in the installation instructions supplied with the antenna and noise suppression components as described in paragraph 4 of this installation section.

3. MOBILE FRONT MOUNTING INSTALLATION PROCEDURE

a. Planning the Installation

A typical front mount mobile installation is illustrated in Diagram 69D800203.

Before proceeding with the actual installation, a definite layout outlining the exact location for each unit of the equipment should be made. Locations should be selected with regards to the following considerations.

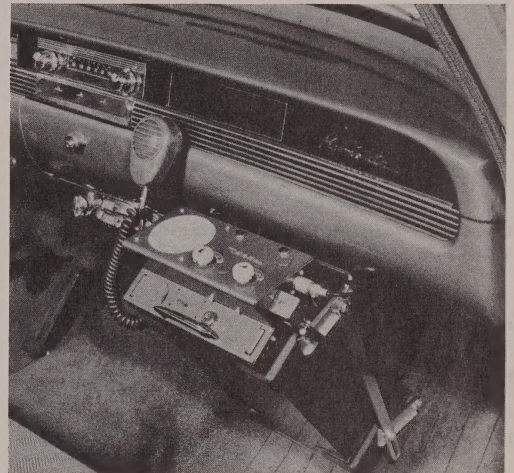
(1) Convenient location for the mobile housing: Unit must be well grounded to vehicle body or frame. This plan should provide a location for the mobile housing which will permit the removal of the chassis from the housing, and which will be as much out of the way as possible for all vehicle occupants.

(2) Convenient location for mounting the antenna: The antenna lead-in must be routed so as to avoid any sharp bends and undue strain at either end connector.

(3) Convenient route for running interconnecting cables.

(4) Convenient location for the fuse block.

b. Housing Installation



FRONT MOUNT INSTALLATION

The front mount mobile housing may be installed in any position. To mount the housing, proceed as follows:

(1) Remove the chassis assembly and the top cover from the housing.

(2) Assemble the mounting bracket assembly to the housing as shown in Diagram 69D800203. The mounting bracket side channels should not be tightened until the installation has been definitely decided upon. The rear mounting bracket can be rotated 200 degrees, thus permitting the rear bracket to be mounted in the most desirable location.

(3) Rotate the U-shaped hanger brackets to the desired angle for flush mounting to the most suitable surface. The U-shaped bracket is riveted to the side brackets and with slight pressure, it may be rotated.

(4) Use any two of the four mounting holes in the bracket and the two short sheet metal screws and lockwashers to fasten the front bracket. The #14 screws require a 0.189" mounting hole (#12 drill).

(5) Use the twolong #14 sheet metal screws and lockwashers to fasten the rear mounting bracket.

(6) Replace the housing top cover and tighten the mounting screws and side channel screws securely.

c. Microphone Bracket Installation

NOTE

If a handset is used, use the hang-up bracket as a template, drill holes, and mount with the supplied hardware.

(1) Determine the location of the microphone and drill two holes 0.125" in diameter (1/8 drill), 1/2" apart or use the bracket as a template.

(2) Fasten the bracket with the two #8 sheet metal screws.

d. Fuse Block Installation

Refer to paragraph 2 f. for Fuse Block Installation.

e. Interconnecting

Refer to Interconnecting Diagram 63E835263.

(1) Route the power cable through the fire-wall.

(a) Connect the three foot cable to a convenient ground.

IMPORTANT

A secure ground connection to the vehicle frame is required for proper operation.

(b) Connect the six and one-half foot cable to the fuse block.

(2) Connect the two foot cable between the fuse block and the ungrounded battery terminal.

f. Antenna and Suppressor Installation

Install the antenna and noise suppression components as described in paragraphs 4 and 5 of this installation section.

4. **MOBILE MODEL SUPPRESSOR INSTALLATION**

Two by-pass capacitors and a distributor suppressor are supplied in the installation kit. The use of these items will depend upon the particular vehicle. Refer to paragraph 3 of the OPERATION section ("NOISE CONSIDERATION IN MOBILE EQUIPMENT") for further details.

(1) Disconnect the lead between the coil and the distributor center terminals.

(2) Cut the lead approximately one and one-half inches from the distributor end of the lead. For best operation the suppressor should be installed as close to the distributor as possible.

(3) Screw the suppressor into the cut ends of the lead.

(4) Reconnect the lead.

(5) Remove the generator ground lead screw.

(6) Place the by-pass capacitor on the ground lead screw and replace the screw.

(7) Connect the capacitor lead to the generator armature terminal. DO NOT CONNECT THE LEAD TO THE FIELD TERMINAL.

(8) Use the second capacitor to by-pass other electrically "noisy" equipment.

5. **AC STATION INSTALLATION PROCEDURE**

The Universal UNI-CHANNEL SENSICON DISPATCHER AC Utility Station equipment is complete in its housing and needs no special installation. It is only necessary to connect a suitable antenna to the antenna receptacle on the control panel and plug the AC power cord into the control panel and any convenient 117 volt cycle outlet.

NOTE

An antenna is not supplied as part of standard AC Utility Models but may be ordered separately if desired.

A microphone clip or handset hang-up bracket is supplied with the control panel of transmitter-receiver models and is designed to be fastened to the top left edge of the control panel.

The housing may be permanently fastened in position using bolts or screws through the mount-

ing holes in the housing. The unit may be mounted in any plane or position.

Refer to Interconnecting Diagram 63E835264 for interconnecting details.

OPERATION

1. PRE-OPERATIONAL CHECKS AND ADJUSTMENTS

Before placing this station in operation, the following checks and adjustments should be made:

a. General

Check all lugs, cable connections, fuses, and bolted connections. Be sure all tubes are firmly in their sockets and tube connectors secure.

b. Power

(1) Turn the VOLUME control on the control head clockwise. A "click" will be heard when the power switch is actuated.

(2) Check to be sure that the green indicator on the control head, (or control panel) and the transmitter receiver filaments are illuminated.

c. Transmitters

(1) Check the transmitter input circuit for the specific audio input connection required for the station; i.e., microphone or handset input. Refer to the "Audio Sensitivity Adjustment" paragraph in the applicable TRANSMITTER section of this manual for connection details.

(2) Load the transmitter to the antenna as described in the TRANSMITTER section of this manual.

(3) Check the transmitter for proper operating efficiency. Refer to the alignment procedure and meter readings detailed in the TRANSMITTER section of this manual.

d. Receivers

(1) Recheck alignment of the receiver as outlined in the RECEIVER section of this manual.

(2) The following procedure for receiver audio output level setting is recommended for all installations except when utilizing QUIK-CALL.

The method of adjusting the audio output for QUIK-CALL installations is outlined in the QUIK-CALL instruction manual.

The audio level control located on the receiver chassis permits adjustment to obtain proper input level to the audio stages to compensate for variations in characteristics of tubes as well as base station transmitter deviation. As this control has more than an adequate range of audio drive, it should be adjusted for maximum desired speaker level with the VOLUME control on the control head or control panel set at maximum (extreme clockwise rotation). Turn the VOLUME control on the control head or control panel to its extreme clockwise rotation. With the base station transmitter transmitting a full normal deviation signal, adjust the "audio level control" on the receiver chassis to a setting just below the point where distortion becomes audible. This setting will provide a minimum of 1.5 watts audio output. Depending upon the characteristics of the output tube, the receiver may have 2 or more watts audio output.

2. OPERATING PROCEDURE

a. To Turn "ON" Equipment:

Turn the VOLUME control clockwise. A click will be heard when the switch is actuated and the green indicator lamp will become illuminated. The receiver is now in full operation and the transmitter filaments are "on".

NOTE

If multi-channel transmitter and/or receiver is used, place frequency selector switch in desired frequency position.

b. To Receive:

(1) Turn the VOLUME control to the full clockwise position.

(2) Turn the SQUELCH control to the full counterclockwise position.

(3) Adjust the SQUELCH control, by turning the control slowly clockwise until the noise is just squelched (cuts out). Turning the control beyond this point will increase the minimum signal necessary to open the squelch circuit.

(4) Set the control head VOLUME control to the desired speaker level with a received signal.

c. To Transmit:

(1) Remove the microphone from the hanger bracket and press the push-to-talk button. The red indicator lamp will become illuminated, indicating the transmitter is "on". If a military or noise cancelling type microphone is used, hold the microphone at approximately a 30° angle from the lips and speak clearly and distinctly across the microphone in a normal or loud voice. If a handset microphone is used, speak directly into the mouthpiece of the handset. **THIS TRANSMITTER CANNOT BE OVER-MODULATED BY SPEAKING LOUDLY.**

(2) To receive reply, release the push-to-talk button. The red indicator lamp will go "off" indicating that the transmitter circuits are no longer energized. The received reply may now be heard over the speaker and/or the handset earpiece (if used).

(3) When the transmission is completed release the push-to-talk button and hang the microphone in the hanger bracket.

d. To Turn "OFF" the Equipment:

Turn the VOLUME control counterclockwise. A click will be heard when the switch is actuated and the green indicator lamp will go "off".

3. NOISE CONSIDERATION IN MOBILE EQUIPMENT

One of the inherent characteristics of frequency modulation is its ability to reduce noise in the presence of a received carrier. To obtain this noise reduction, it is necessary that the receiver be tuned exactly to the received carrier. It is assumed that this tuning operation has been completed and so the procedure need not be repeated.

Interfering noise may be of a local nature produced by sparking motors, fluorescent lights, and other electrical devices. Interference may also occur from industrial induction or dielectric units in nearby plants.

Electric fences will sometimes radiate interference three or four miles; this type of inter-

ference is characterized by an intermittent buzzing noise. Nearby automobiles will also radiate interference. All the aforementioned noise sources are of a local nature and may be drawn away from in a mobile installation.

In a mobile installation, the vehicle's electrical system must be given a thorough check so as to limit the production of electrical interference. The level of interference created by the vehicle in which the equipment is installed will be limiting the level for satisfactory reception. Care must be taken to reduce this interference to the lowest possible level.

In regards to a mobile radio installation the vehicle's electrical system and static electricity may produce very undesirable interference noticeable at the radio equipment speaker. This noise, depending upon its magnitude, can seriously reduce the maximum range of communications and can hamper effective communications at any range. A noise reduction method employing capacitive and resistive components is illustrated in the Typical Electrical System By-Passing Detail ATIC-678. Another method employing capacitive and resistive components plus shielding is illustrated in Typical Electrical System Shielding and By-Passing Detail 63B839101.

The noise entering the receiver through the antenna will be reduced as it passes through the limiters provided the desired signal is of sufficient level to saturate the limiters. However, any electrical interference that enters the receiver and is directly coupled into the audio circuit appears as noise at the speaker. Impulse noise, i.e., sharp, high amplitude pulses, can appear at the speaker in two ways. In passing through the receiver a pulse may be shifted in phase, appearing as an FM carrier component, reproduced at the speaker. A tuned lead in the vehicle may be shock excited into oscillation by a pulse and the oscillation appears at the speaker as noise.

The source of noise can generally be determined by its sound at the speaker. For best results in noting noise, the receiver should be receiving a weak signal which produces not less than 10 db. nor more than 30 db. noise quieting.

NOTE

Be sure that the receiver is exactly on frequency.

Greater noise quieting will mask the noise by limiter action; less quieting will mask the interfering noise with inherent receiver thermal noise.

Ignition Noise is characterized by a "popping" sound that varies in frequency with engine speed. This type of interference may be generated in the ignition coil, the distributor, the spark plugs, or the high voltage leads and radiated through some lead connecting these components. The vehicular ignition system is the worst offender from the standpoint of noise generation. The impulse noise produced must be kept under control by both proper preventive maintenance and addition of suitable noise suppressor items. It is necessary to check for; (1) distributor breakerpoints in good condition, (2) ignition condenser in good condition, (3) all ignition system connections free of corrosion and making good contact, (4) circuit continuity in the high voltage leads, (5) sufficiently high spark plug breakdown voltages, and (6) spark plug electrodes properly spaced and in good condition. Mobile installation kits usually contain a noise suppressor resistor to be placed in the lead from the ignition coil to the distributor and a shielded by-pass capacitor to be connected from the ignition coil primary to ground.

Other noise suppression measures commonly used are additional "lossy" elements in the ignition circuit to attenuate the impulses. Resistor type spark plugs or spark plug suppressors have been found of great assistance in many cases. While the manufacturer claims superior engine performance is obtained by using these plugs, it is recommended that a check be made to assure (1) that the proper plugs are being used, and (2) that the engine performance is at least equal to that obtained using standard plugs. The distributor noise suppressor can be eliminated if a distributor with a built-in resistor is substituted for the standard distributor. Resistance ignition cable can be substituted for standard ignition cable to obtain additional attenuation. In some cars, it has been found that excessive resistance in the spark plug circuit may produce rough idling, particularly in cold weather. Thus, it may not be possible to use a distributor noise suppressor, resistance ignition cable and resistor spark plugs simultaneously in all cars.

In stubborn ignition interference problems, be sure to check the continuity of the spark plug leads. Through use of an ohmmeter or other continuity indicator such as dry battery and small bulb, you may find one or more leads open. Usually, an open circuit will be found at the spark plug end. In an ignition system where the end of the lead and the terminal are molded in rubber, the terminal is probably not soldered to the conductor. The connection may be strictly mechanical.

By squeezing the terminal with a pair of pliers, it may register continuity. In this case, the lead is probably satisfactory. With an intermittent indication, it may be necessary to either replace the lead or to open the terminal and solder the lead to the terminal. If the lead is replaced, be sure to check the replacement lead for continuity. If the lead is opened and soldered, be sure to provide suitable protection against weather induced terminal corrosion.

It is always desirable to minimize the number of contacts required in an ignition system to minimize interference as a result of poor connections. Thus, resistor spark plugs are preferred to standard spark plugs plus spark plug suppressors and resistance ignition cable is preferred to standard ignition cable plus series suppressors.

Today some manufacturers are tending to pre-equip new models with either resistance ignition cable or resistor spark plugs or both. In such cases, substitution need not be made. Resistor spark plugs and resistor-equipped distributors are produced by the Electric Auto-Lite Co. Resistance ignition cable is manufactured by the Packard Electric Division of the General Motors Corp.

Ignition noise can be coupled capacitively from high voltage to low voltage leads, can be radiated from high voltage leads, can be radiated from low voltage leads or other metallic linkages due to shock excitation from ignition leads, or may be radiated from the distributor or ignition coil. Many trial-and-error methods of counteracting such problems are available but may consume considerable time and expense in the process. It is desirable to use a noise meter to find the point of maximum intensity of noise radiation and correct the problem at that point if possible. Among the trial-and-error methods are those listed below.

If the lead between the ignition coil and the distributor, or any other ignition lead, is a critical length for radiating on the receiver frequency, noise can be reduced by changing its length. Capacitive coupling from high voltage to low voltage leads can be minimized by achieving maximum separation between such leads and, for extreme cases, by shielding the leads or running the leads in a separate conduit.

In very stubborn cases where the aforementioned methods fail to reduce the noise interference to a satisfactory level, it will be necessary to completely shield the ignition system. Both the primary and secondary leads should be shielded. Also, shielded resistor type spark plugs should be used.

Generator Noise is characterized by a high-pitched "whine" and varies with engine speed. This type of interference will persist if the ignition is switched off while the engine is running at a moderate speed. Installation of the bypass capacitor on the armature terminal of the generator as (outlined in paragraph f, page 9 will provide further attenuation. Further noise elimination in the generator system may be as follows:

- a. Install a .5 mfd bypass capacitor (not supplied) from the battery (BAT.) terminal of the voltage regulator to ground.
- b. Install a .25 mfd bypass capacitor (not supplied) from the armature (ARM.) terminal of the voltage regulator to ground.
- c. If the aforementioned steps do not provide desired results, the MOTOROLA P-346 Generator Filter or equivalent may be used.

CAUTION

DO NOT CONNECT A BYPASS CAPACITOR DIRECTLY TO FIELD (F.) terminal of the voltage regulator.

Voltage Regulator Noise is characterized by a "raspy" sound. This noise may be reduced by installing a 4 ohms resistance in series with a .002 mfd capacitor in series from the field (F.) terminal of the voltage regulator to ground. Refer to typical main reduction diagram for details. These components are not supplied. This network is unnecessary in most installations.

Gauge Noise is characterized by a "hissing" or "crackling" sound which may be detected by jarring the individual gauges while the ignition switch is on. The effect of each individual gauge will be made more pronounced by disconnecting the "hot" lead of all gauges except the one being checked. One of the most frequent offenders, the temperature gauge, can be corrected by by-passing the temperature gauge lead at the motor block. If the noise still persists, also by-pass the gauge at the dash.

Oil Sender Noise is characterized by a low-pitch "clicking" sound. The noise rate varies with the oil pressure and stabilizes at the point of maximum pressure. This interference can be eliminated by installing a by-pass capacitor from the oil gauge lead terminal on the oil sender to ground.

Wheel Static is characterized by an irregular "popping" sound that disappears when the brakes

are lightly applied. This interference is particularly noticeable in dry weather. The front wheels, insulated from the axles by a film of grease, are the primary offenders on this score. Standard grounding brushes or springs, such as front wheel static eliminators will be satisfactory in most cases where this interference is present.

Tire Static is characterized by a more regular or sharper "popping" sound that becomes much worse at 30-50 m.p.h. The use of anti-static powder in the tire tubes eliminates this type of interference.

In most modern cars and trucks, the vehicle body and frame forms the ground return for the electrical circuits. Differences in conductivity, inadequate bonds between adjacent conductors and unequal current distributions result in potential differences throughout the vehicle. The miniature arcs created by these potential differences can be eliminated by eliminating the potential differences themselves. Effective use of copper bonding braid or brass contact wipers will minimize this interference.

Bonding the hood, the exhaust pipe and the muffler, as well as the motor block to the frame will probably provide the greatest improvement. The hood can utilize contact wipers along the edges plus copper braid at the hinge, or the copper braid may be placed along the edge of the body so that the hood will mesh into it as it closes. The end of the braid should be connected to the hood with sufficient slack to prevent breakage at the hinge. One end of the hood bonding braid should be connected to the battery ground terminal. The exhaust pipe and muffler are often suspended from the frame with a rubber mounting so that good contact can be obtained only by additional bonding. If the engine is not already well grounded to the frame with copper braid, additional bonding may be required.

NOTE

Paint and corrosion must be removed from the area to which the bonding strap is fastened to the vehicle.

Other points to check for proper bonding include the accelerator and choke rods or cables, the brake and speedometer cables, gearshift linkages, rear axle assembly, doors and fenders.

It is a characteristic of FM receivers that, at one point in the alignment, a null point in impulse noise response will be reached. This null

may vary from installation to installation. As it leaves the factory, the receiver is tuned to the exact operating frequency and is properly adjusted for proper noise balance. The RECEIVER section of this manual contains a paragraph on "Adjustment For Reduction of Ignition Noise". This procedure, in general, consists of detuning one of the first IF stage coils slightly until a noise minimum is reached. Such adjustment should not reduce the limiter (position 2) meter reading by more than 1/2 microampere. Refer to the applicable instruction manual for complete details. This procedure, incidentally, will reduce the impulse noise effects due to the vehicle in which the receiver is mounted and will also reduce such noise due to other causes such as other passing vehicles.

Specific noise sources may be isolated to some extent by setting up the following conditions. When the vehicle is standing still with the ignition switch off, any noise heard will probably be external to the vehicle. Static discharge noise will be added when the vehicle is moving with the ignition switch off. If the vehicle is coasting in gear, with the ignition switch off, generator noise will be added to the other, if present. Noise produced by inadequate bonding will be most noticeable when maximum current is being drawn from the battery, and may be increased when the vehicle is in motion.

It is impossible to give an exact procedure to counteract noise in all cases; too many variables exist. With an understanding of some of the sources of noise, an intelligent approach will often save considerable time and money and increase both operational efficiency and operator satisfaction with mobile receivers.

Refer to the Noise Identification and Suppression Chart at the end of this section for further details.

4. MAINTENANCE OF MOBILE EQUIPMENT

a. Terminal Connections

Battery and generator connections must be clean and tight at all times to prevent power losses due to excessive voltage drops across loose connections. Check weekly.

b. Fuses

Fuses must fit snugly in the fuse holders to prevent voltage drops at these points. Check weekly.

c. Battery Charge

The vehicle battery should be checked weekly to be sure that it is properly charged. A specific gravity measurement is recommended for this purpose. The reading obtained should be in agreement with the normal operating specifications stipulated by the battery manufacturer.

d. Power Input Cables

Power cable connections may be checked by measuring the overall voltage drop from the battery to the equipment. With the transmitter "on" and the vehicle motor running, the voltage drop from the ground cable of the radio equipment to the battery ground terminal should be negligible. The voltage drop in the power cable from the (hot) battery terminal to the equipment should not exceed 0.6 volts (6 volt models) or 1.2 volts (12 volt models). Cable voltage drop will be the difference between the voltage reading obtained from the battery terminal to ground and the reading obtained from a "voltage input measuring point" on the mobile equipment to ground. A convenient "voltage input measuring point" for mobile units employing a vibrator type power supply is pin #19 on the input receptacle of the power supply. On mobile units employing a dynamotor type power supply; input voltage may be measured at one of the contact terminals of relay K 1 located on the top front end of the power supply chassis (contact with BLK lead attached). The drawer assembly must be partially pulled out of the mobile housing to permit access to "voltage input measuring point".

e. Vehicle Generator and Voltage Regulator

Routine maintenance checks should be made on the vehicle generator and voltage regulator to insure proper operation of the radio equipment. Periodic maintenance should include:

- (1) Checks of generator brush condition and replacement if necessary.
- (2) Checks of generator armature condition.
- (3) Check of generator output and voltage regulator setting. This setting should conform to either the car manufacturer's or the generator manufacturer's recommendations.
- (4) Check of generator lubrication and re-lubrication if required.

f. Antenna

Routine preventive maintenance of the mobile systems should include a continuity check of the braided lead between the antenna rod and the coaxial lead-in. Ordinarily hidden from view within the antenna base assembly, the lead may become frayed or broken without attracting immediate notice. However, any decrease in RF continuity

introduced here will cause a decrease in radiated power and receiver sensitivity. Moreover, intermittent contact can generate undesirable interference noise through:

(1) High contact resistance.

(2) Imperfect bonding which permits the noise inherent in spring action to enter the receiver.

NOISE IDENTIFICATION AND SUPPRESSION CHART

Characteristics of Noise at Speaker	Source of Noise	How to Check Source of Noise	How to Suppress Noise
Identified as popping sound	Ignition	Noise varies in frequency with engine speed and will disappear when ignition is switched off.	1. Check to be sure: (1) Distributor breaker points are in good condition. (2) Ignition condenser is in good condition. (3) All ignition system connections are free of corrosion & making good contact. (4) THERE IS DC CONTINUITY IN HIGH VOLTAGE LEADS. (5) There are sufficient high spark plug breakdown voltages. (6) Spark plug electrodes are properly spaced and in good condition. 2. Bond each corner of the motor block to chassis ground using a heavy copper grounding braid. 3. Damp the high voltage by installing a resistor suppressor in the distributor rotor lead, or suppressors in the ignition cables or on top of the spark plugs. 4. Install resistor spark plugs or ignition cables.
Identified as a high-pitched whine	Generator	Noise varies with engine speed and will persist if ignition is switched off while engine is running at a moderate speed.	1. Install a .25 - .5 mfd. by-pass or coaxial capacitor between the "hot" armature and chassis ground. 2. Install .25 mfd capacitor to armature (ARM.) and .5 mfd capacitor to battery (BAT.) terminal of voltage regulator to ground. 3. Install a MOTOROLA Model P-346 Generator Filter in series with the armature.
Identified as a raspy sound	Voltage Regulator	Look for arcing of voltage regulator contacts.	Install 4 ohms resistance in series with .002 capacitor from field (F.) terminal to ground.
Identified as a hissing or crackling sound	Gauges	Noise may be detected by jarring the individual gauges while the ignition is on.	Install .25 - .5 mfd. by-pass capacitors where needed.
Identified as a low-pitch clicking sound	Oil Sender	Noise rate varies with oil pressure and stabilizes at point of maximum oil pressure.	Install .25 - .5 mfd. by-pass capacitor from gauge lead terminal on Oil Sender to Chassis Ground.
Identified as an irregular popping sound	Wheel Static	Noise disappears when brakes are lightly applied.	Install suitable grounding brushes or springs such as front wheel static eliminators.
Identified as a more regular or sharper popping sound	Tire Static	Noise becomes much worse at 30-50 m.p.h.	Use anti-static powder in tire tubes.

NOTE

Bonding the hood, the exhaust pipe and muffler, the accelerator and choke rods or cables, the brake and speedometer cables, gearshift linkages, rear axle assembly, doors and fenders to chassis ground will provide the greatest improvement toward the suppression or elimination of noise.

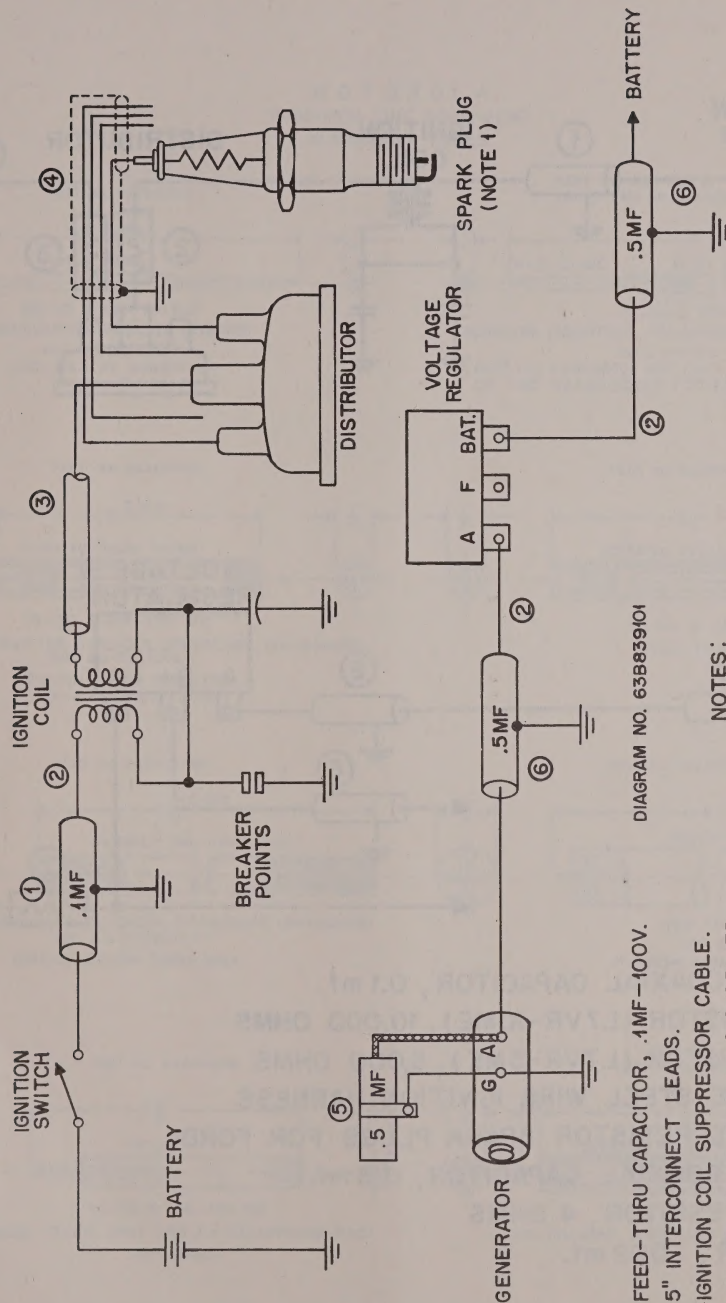
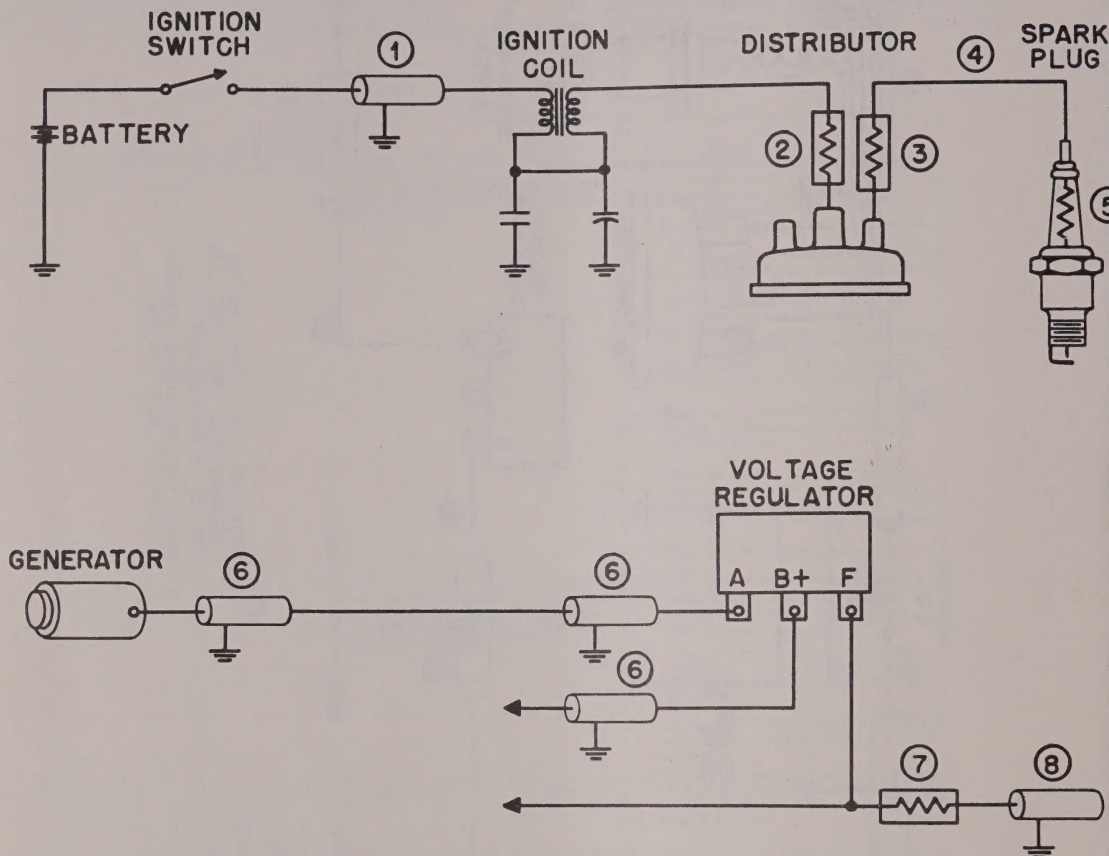


DIAGRAM NO. 63B839101

- ① FEED-THRU CAPACITOR, .1MF-100V.
- ② 5" INTERCONNECT LEADS.
- ③ IGNITION COIL SUPPRESSOR CABLE.
- ④ COPPER BRAID SHIELD, 2 SUPPLIED.
- ⑤ BY-PASS CAPACITOR, .5MF-150V.
- ⑥ FEED-THRU CAPACITORS, .5MF-100V., TWO SUPPLIED.

NOTES:
1. RESISTOR TYPE SPARK PLUGS
RECOMMENDED. USE AUTO-LITE
ARL-8 OR EQUIVALENT.
2. HOOD WIPERS, SUPPLIED WITH
TK294 KIT, NOT SHOWN.

TYPICAL ELECTRICAL SYSTEM
BYPASSING DETAIL



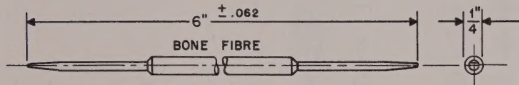
1. SPRAGUE COAXIAL CAPACITOR, 0.1 mf.
2. ERIE RESISTOR (L7VR-10ME), 10,000 OHMS
3. ERIE RESISTOR (L7VR-5ME), 5,000 OHMS
4. AUTO-LITE STEEL WIRE IGNITION HARNESS
5. AUTO-LITE RESISTOR SPARK PLUGS FOR FORD
6. SPRAGUE COAXIAL CAPACITOR, 0.5 mf.
7. CARBON RESISTOR, 4 OHMS
8. CAPACITOR, .002 mf.

MOTOROLA

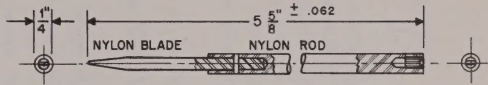
RESEARCH LINE EQUIPMENT

ALIGNMENT TOOLS

PART NO. 66A891568

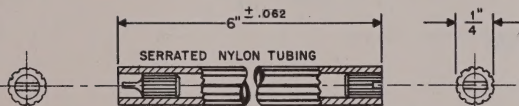


25-50 & 152-174 MC
SENSICON & DISPATCHER RECEIVER
TOP TUNING ONLY
(REPLACED BY 66A835721)

PART NO. 66A835721
(ALSO PART NO. 66A800824)

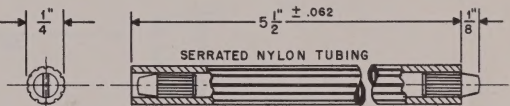
25-50 & 152-174 MC
SENSICON, DISPATCHER, UNI-CHANNEL & AM RECEIVER
TOP & BOTTOM TUNING
(PART NO. 66A835721 MAY ONLY BE USED IN PLACE
OF THE 66A8000824 FOR ALL APPLICATIONS)

PART NO. 66A891488



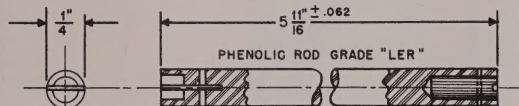
25-50 & 152-174 MC
STRIP TRANSMITTER, SENSICON, DISPATCHER, UNI-CHANNEL
AND AM RECEIVER
RECEIVER BOTTOM TUNING ONLY
(REPLACED BY 66A835721)

PART NO. 66A891487



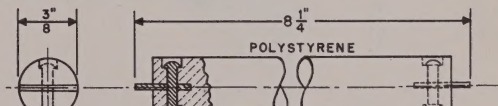
25-50 & 152-174 MC
STRIP TRANSMITTER

PART NO. 66A474489



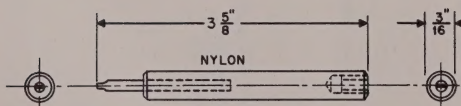
STRIP TRANSMITTER, SENSICON, DISPATCHER, UNI-CHANNEL
AND AM RECEIVER
RECEIVER BOTTOM TUNING ONLY

PART NO. 66A84645



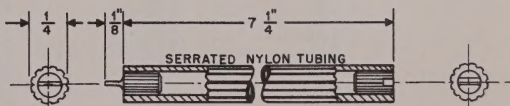
152-174 MC
1/4 KW
P-8310-B FINAL AMPLIFIER

PART NO. 66A891846



25-50 & 152-174 MC
"HANDIE-TALKIE" UNIT AND FM RADIO PHONE PACK
ALL STAGES

PART NO. 66A810479



UNI-CHANNEL FREQUENCY MONITORS



CUT END OF CABLE AND REMOVE $1\frac{1}{8}$ " OF VINYL JACKET.



TRIM END OF CABLE SO THAT 5/8" OF CENTER CONDUCTOR IS BARE AND 1/16" OF BRAID REMAINS. TIN EXPOSED CONDUCTOR AND BRAID. SLIDE BACK SHELL AND COUPLING RING ON CABLE.



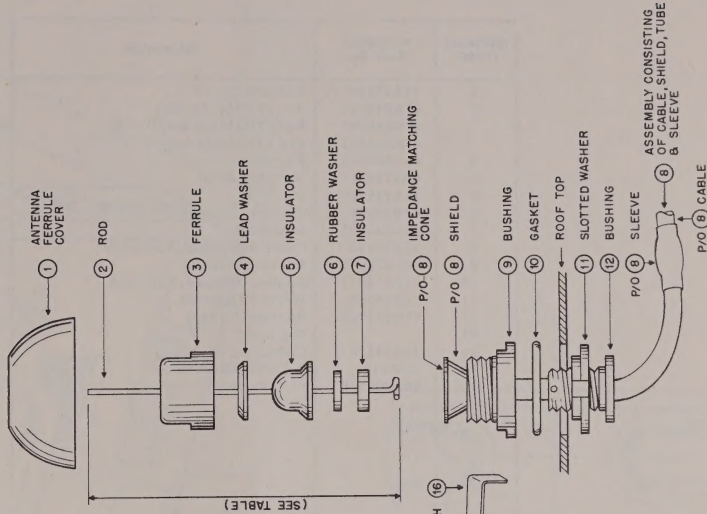
SCREW THE PLUG SUB-ASSEMBLY ON TO THE CABLE.
SOLDER PLUG SUB-ASSEMBLY TO BRAID THROUGH
SOLDER HOLES. SOLDER CENTER CONDUCTOR TO CONTACT.
CAUTION - DO NOT USE EXCESSIVE HEAT OR SOLDER.
USE VERY HOT IRON, SOLDER QUICKLY AND IMMEDIATELY
CHILL WITH COLD WET CLOTH.



SLIDE COUPLING RING OVER PLUG SUB-ASSEMBLY, POSITION BACK SHELL SUCH THAT SUFFICIENT CLEARANCE REMAINS TO PERMIT FREE ROTATION OF COUPLING NUT; TIGHTEN SET SCREW.

MODEL	FREQ. RANGE	ROD LENGTH
TU316-L	144-152 MC.	19 1/4"
TU316-M	152-162 MC.	17 3/4"
TU316-H	162-174 MC.	16 7/8"

EXPLODED VIEW



ASSEMBLED VIEW

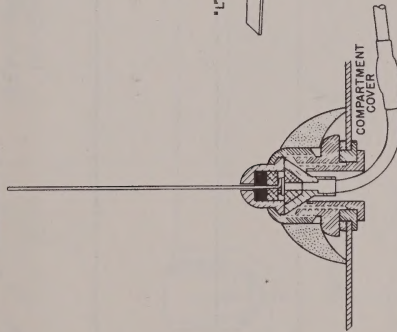
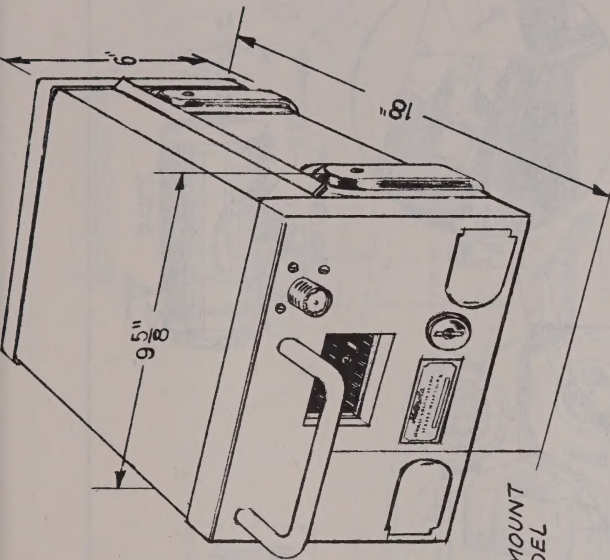


DIAGRAM NO. 690842617

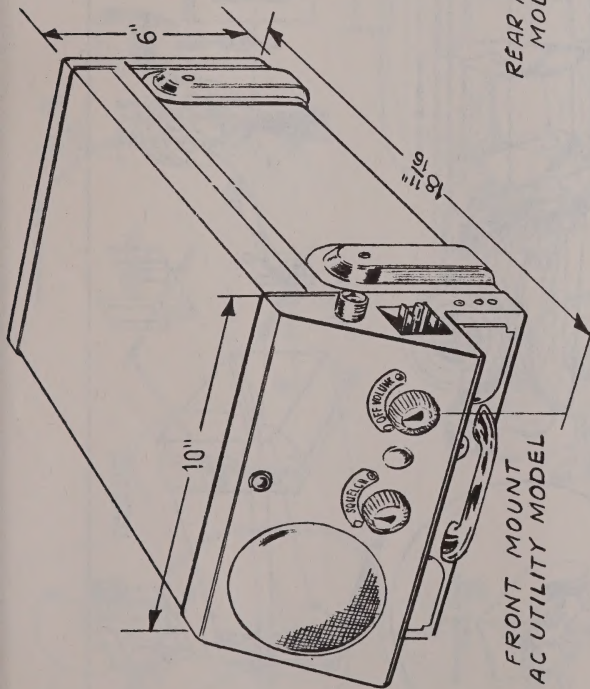
TU316 SERIES ANTENNAS PARTS LIST

Reference:
Installation Detail
69C842617

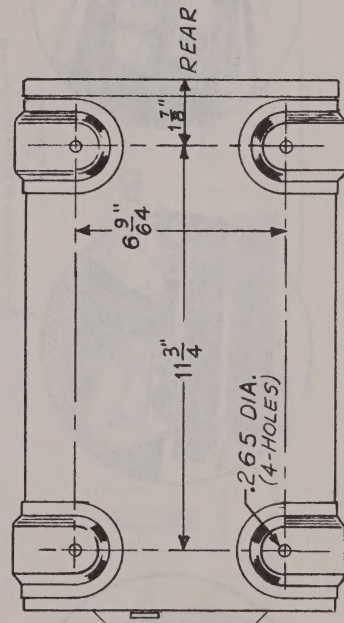
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
1	15A475299	Ferrule Cover
2	47K844391	Rod (TU316-L only)
	47K844392	Rod (TU316-M only)
	47K844393	Rod (TU316-H only)
3	43A480576	Ferrule
4	4A474911	Washer, Lead
5	14A839960	Insulator
6	4A822404	Washer, Rubber
7	14A822405	Insulator
8	1V839952	Cable & Contact Assembly
9	43A480573	Bushing (upper)
10	32A474917	Gasket, Copper-Asbestos
11	4A474901	Washer (slotted)
12	43A839962	Bushing (lower)
13		Not Used
14	28A85558	Connector Plug
15	10M519	Installation Wire
16	66A480578	"L" Wrench



REAR MOUNT
MODEL

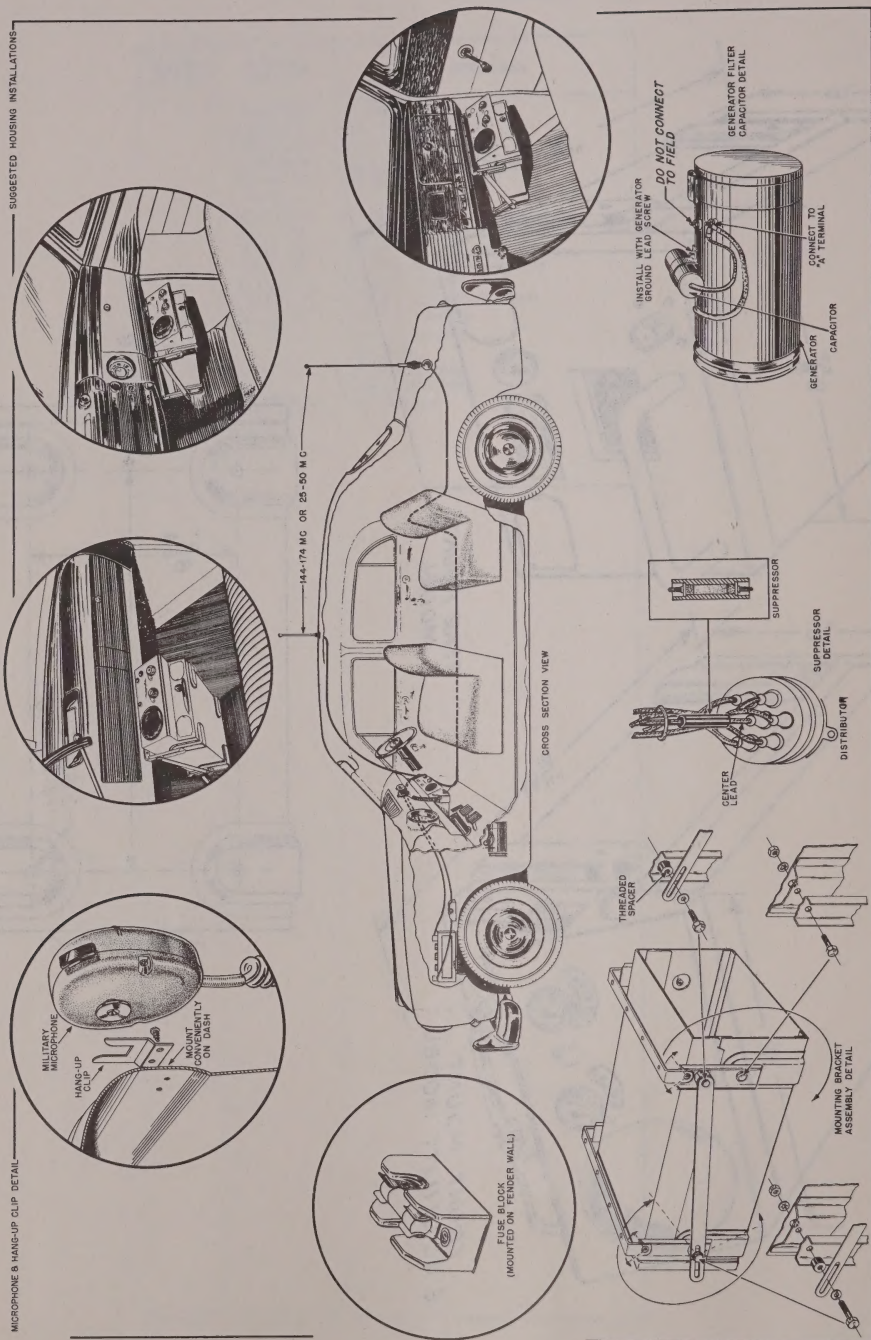


FRONT MOUNT
& AC UTILITY MODEL

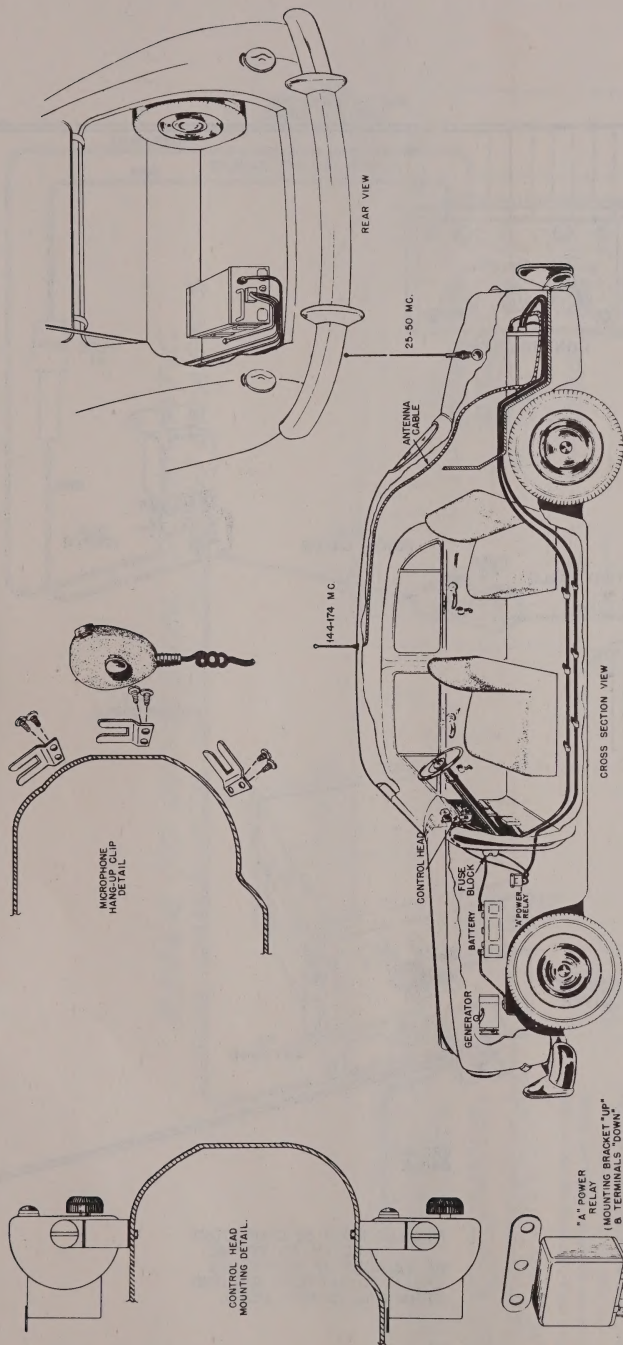


BOTTOM VIEW

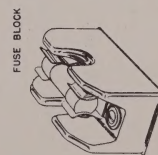
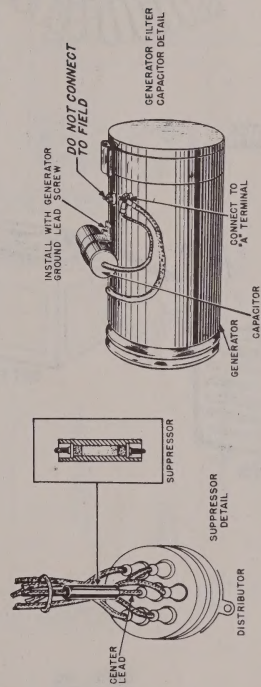
TYPICAL FRONT-MOUNT INSTALLATION INSTALLATION DETAIL



TYPICAL TRUNK-MOUNT INSTALLATION DETAIL

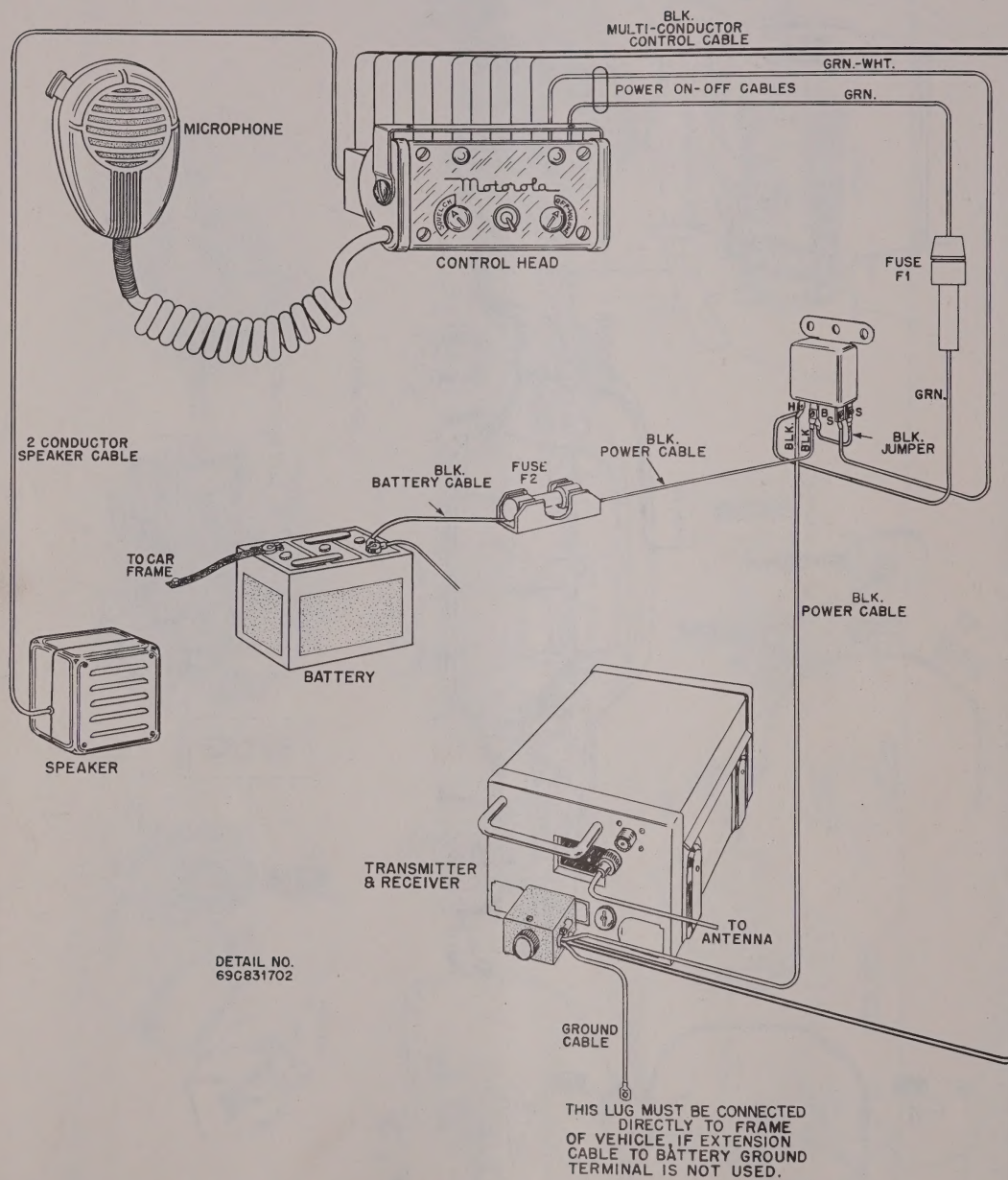


DETAIL NO. 69D802254



"A" POWER RELAY
(MOUNTING BRACKET "UP"
B TERMINALS "DOWN")

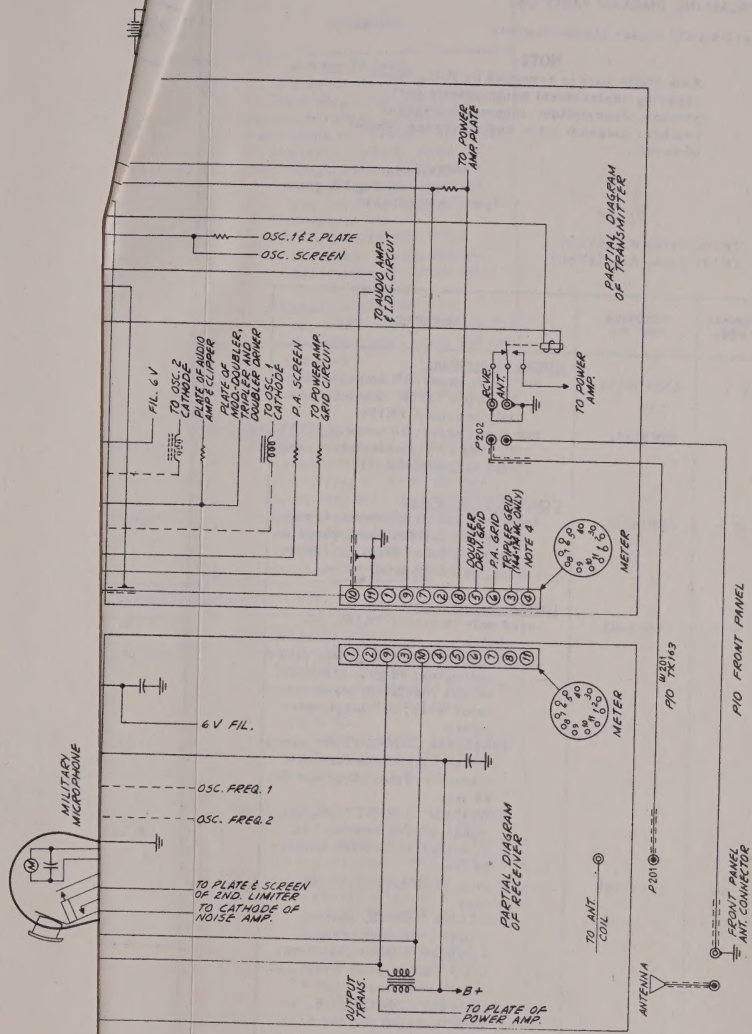
10" HOUSING, TRUNK MOUNT
(TU124A OR TU203A SERIES CONTROL HEADS)
CABLING DETAIL



DETAIL NO.
69C831702

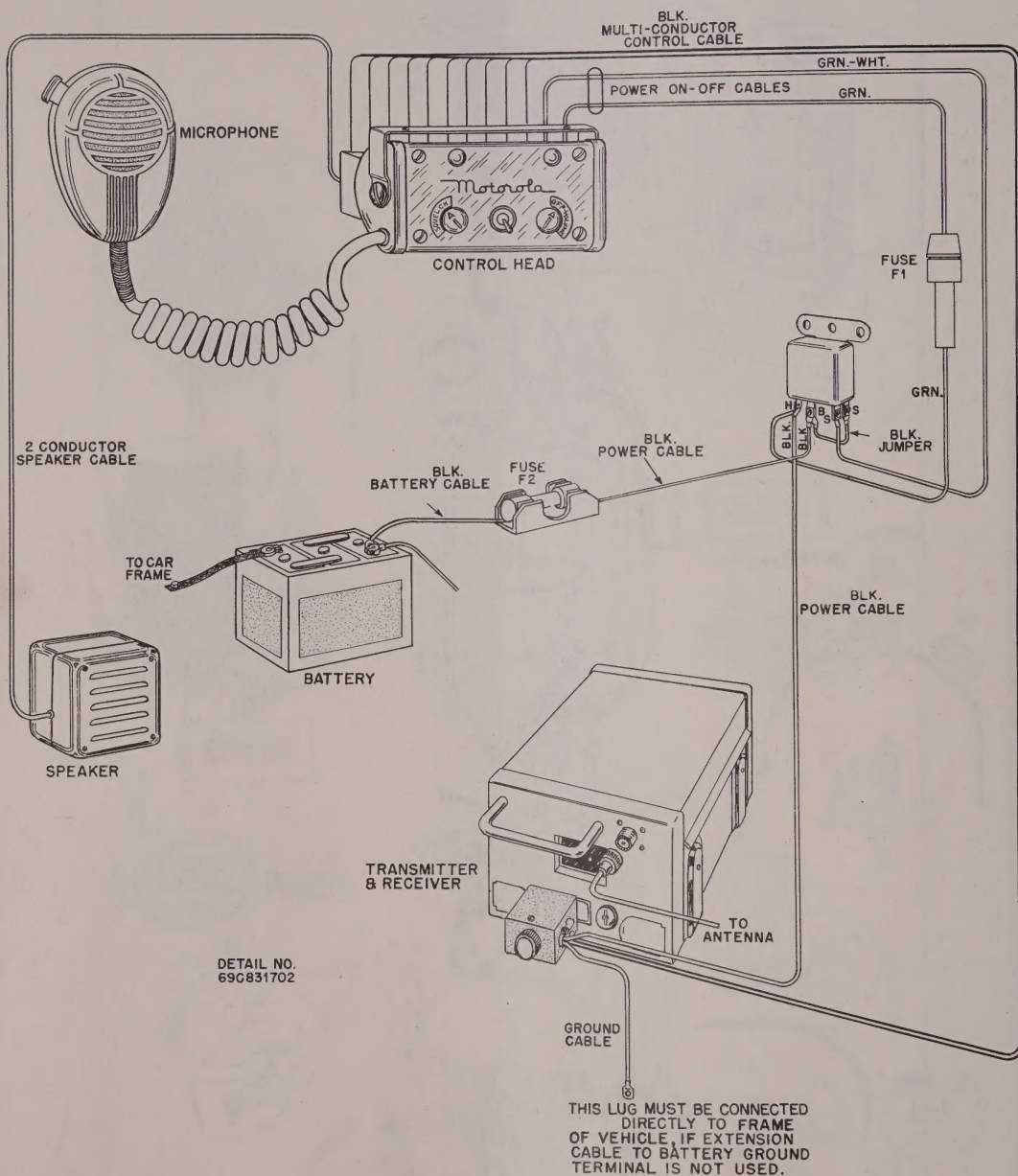
FRONT MOUNT
(TU190 OR TU206 CONTROL PANELS)
INTERCABLING DIAGRAM

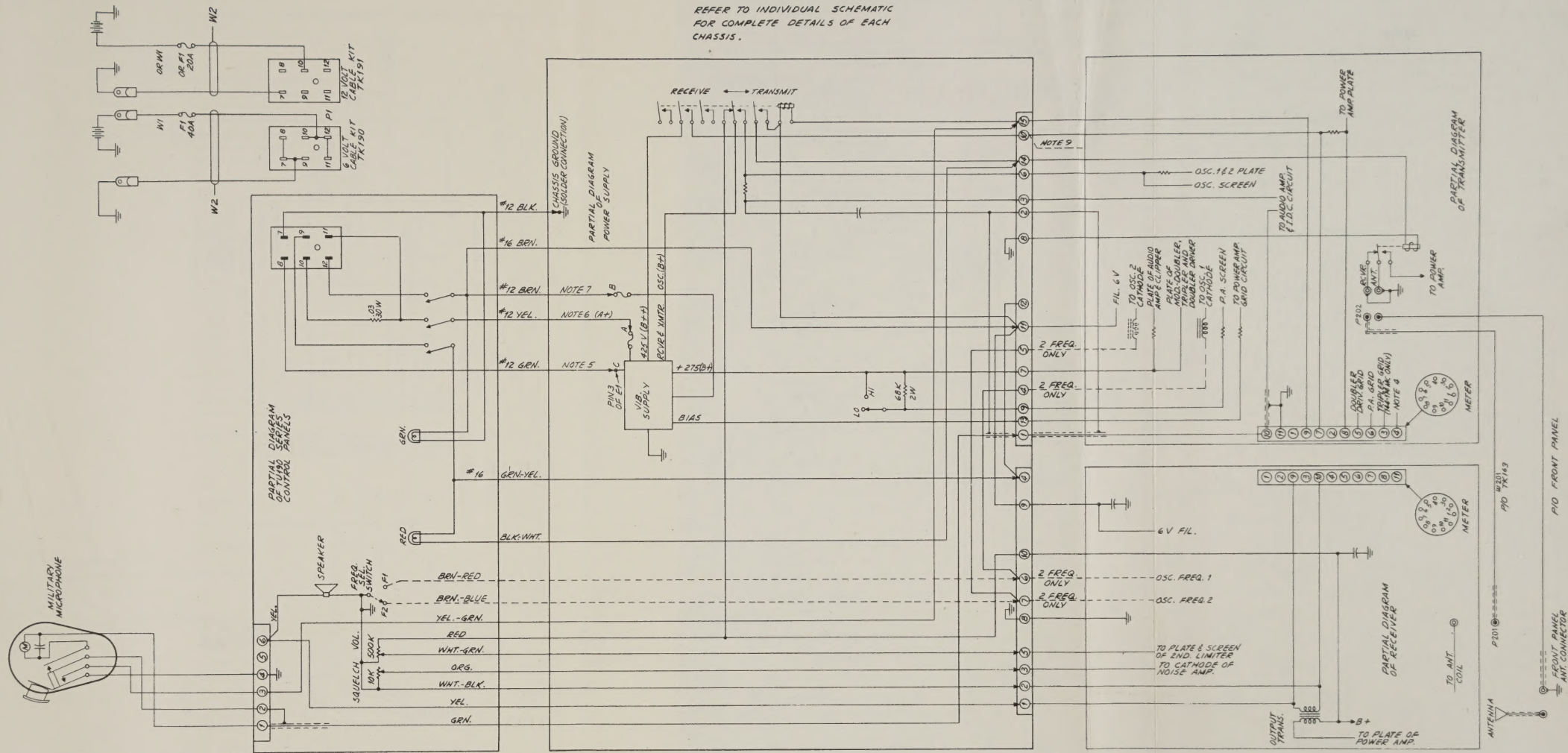
REFER TO INDIVIDUAL SCHEMATIC
FOR COMPLETE DETAIL OF EACH CHASSIS



1. DETAIL "A" SHOWS CONNECTIONS OF TU206 SERIES CONTROL PANELS ONLY. CONNECTIONS WILL DIFFER FROM CONNECTIONS OF TU190 SERIES.
2. TERMINAL BOARDS ARE DESIGNATED BY LETTER REFERENCE ONLY. REFER TO INDIVIDUAL SCHEMATIC DIAGRAM FOR APPLICABLE USE OF JUMPER.
3. THE FREQUENCY SELECTOR SWITCH AND CONTROL PANELS ONLY.
4. PIN 4 OF WHITE METEERING CONNECTOR CONNECTS TO POWER GRID IN 25-54 MC EQUIPMENT OR EQUIVALENT DOUBLER GRID IN 144-174 MC EQUIPMENT.
5. GROUND FOR 6V OPERATION, +6V FOR 12V OPERATION.
6. +6V OR +12V DEPENDING ON PRIMARY POWER.
7. +6V WITH 6 OR 12V PRIMARY POWER.
8. CONNECTORS ARE SHOWN FROM EXTERNAL SIDE (OPPOSITE WIRING SIDE).
9. RED-GAN LEAD (DOUBLER DRIVER PLATE) USED WITH 144-174 MC EQUIPMENT ONLY.

10" HOUSING, TRUNK MOUNT
(TU124A OR TU203A SERIES CONTROL HEADS)
CABLING DETAIL



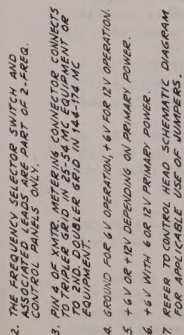


REFER TO INDIVIDUAL SCHEMATIC
FOR COMPLETE DETAILS OF EACH
CHASSIS.

1. DETAIL 11 SHOWS CONNECTIONS OF 120V, 240V AND 480V TO THE MAIN POWER DISTRIBUTION BUS. THE DIFFER FROM CONNECTIONS OF TURBO SERVICES.
2. TERMINAL BOARDS ARE DESIGNATED BY LETTER AND NUMBER FOR REFERENCE. ONLY THE TERMINAL BOARD NUMBER IS TO BE INDICATED FOR APPLICABLE USE OF JUMPER.
3. THE FREQUENCY SELECTOR SWITCH AND CONTROL PANELS ONLY.
4. PHAS OF FIVE-Phase CONNECTOR CONNECTS TO FUTURE GRID IN 25-50 KA EQUIPMENT OR EQUIPMENT.
5. GROUND FOR 6/1 OPERATION, +4V FOR 12V OPERATION.
6. +4V OR 12V DEPENDING ON PRIMARY POWER.
7. +4V WITH 48V OR 12V PRIMARY POWER.
8. CONNECTIONS ARE SHOWN FROM INTERNAL.
9. TERMINAL BOARD (CONSIDER OTHER PLATE) USED WITH 48V KA EQUIPMENT ONLY.

FRONT MOUNT
(TU190 OR TU206 CONTROL PANELS)
INTERCABLING DIAGRAM

FRONT MOUNT MODELS WITH PROVISION FOR QUIK-CALL INTERCABLING DIAGRAM



INTERCABLING DIAGRAM PARTS LIST

Model D41GGV Series Mobile Stations

NOTE

This Parts List is arranged by Kits. When ordering replacement parts specify part number, description, schematic diagram number, diagram issue and reference symbol of part.

Reference:
Intercabling Diagram
63E835263

- TK190 Cable Kit (6Volt)
TK191 Cable Kit (12Volt)

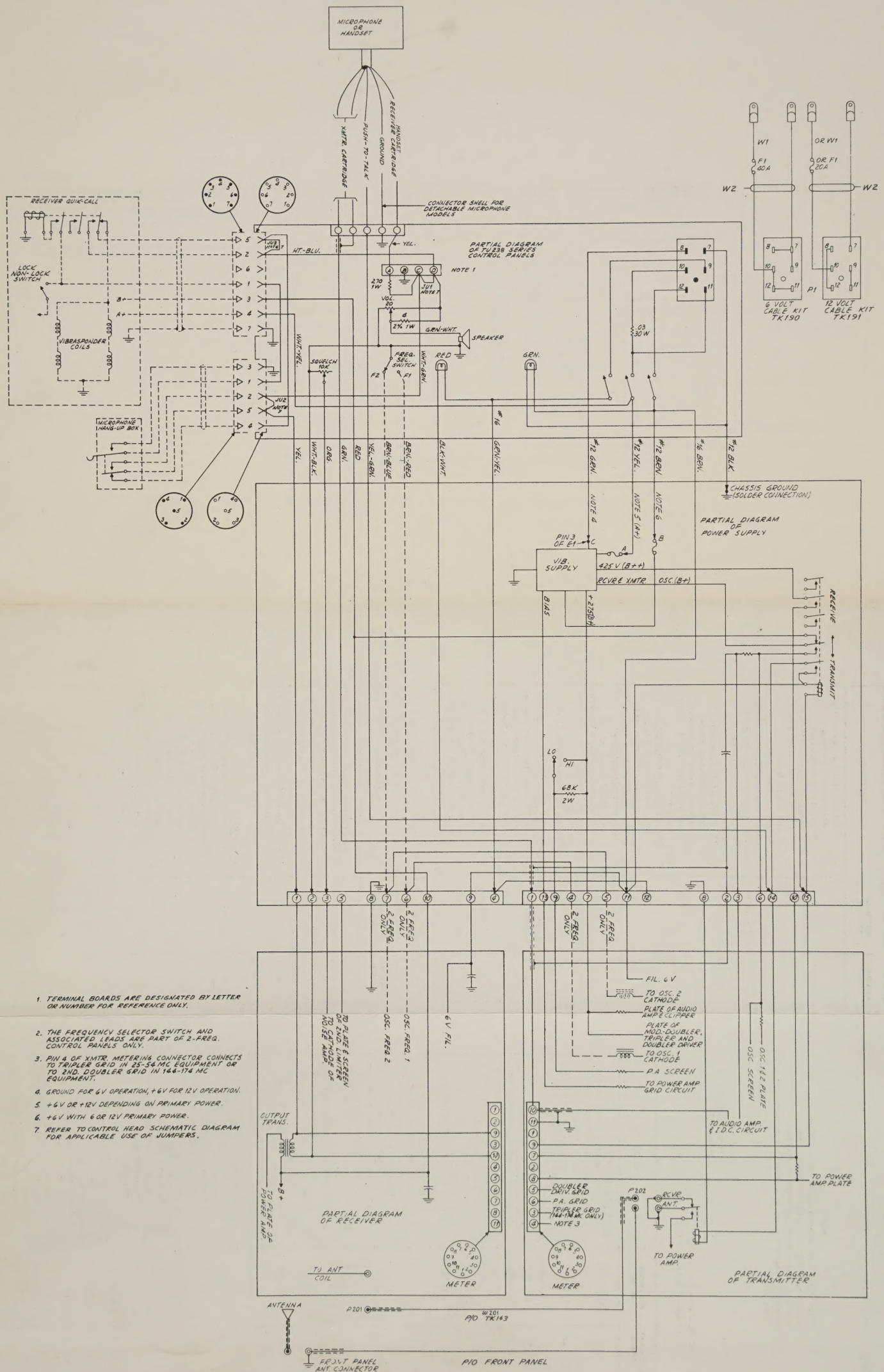
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
F 1	65K830314	<u>FUSE, Cartridge:</u> one time; paper; 40 ampere; 250 V 3" long x 13/16" diameter; used only in model TK190
or	65K52482	one time; paper; 20 ampere; 250 V; 2" long x 9/16" diameter; used only in model TK191
P 1	9B834756	<u>CONNECTOR, Plug:</u> female; 6 contact; polarized; rectangular molded black phenolic base; includes SHELL, connector; cable mounted
W 1	1V835443	<u>LEAD, Electrical:</u> used only in model TK190; includes: 30A16396 CABLE, power single conductor; #8 ga.; stranded; rubber insulated; black cotton outer wrap; 24" length required 29K824454 CONNECTOR, terminal: closed end for 5/16" diameter; stud; other end for #8 lead 29K835302 CONNECTOR, terminal: closed end for 1/4" diameter stud; other end for #8 lead
or	1V835445	used only in model TK191; includes: 30A16396 CABLE, power: single conductor; #8 ga.; stranded; rubber insulated; black cotton outer wrap; 24" length required 29K824454 CONNECTOR, terminal: closed end for 5/16" diameter; stud; other end for #8 lead 29K824434 CONNECTOR, terminal: closed end for #10 diameter; stud; other end for #8 lead
W 2	1V835442	<u>CABLE ASSEMBLY, special purpose:</u> Control Panel to Fuse Block and Ground; includes: 30A16396 CABLE, power: single conductor; rubber covered; #8 ga. stranded; one 6-1/2' and one 8' length required 29K824454 CONNECTOR, terminal: closed end for 5/16" diameter stud; other end for #8 lead 29K835302 CONNECTOR, terminal: closed end for 1/4" diameter stud; other

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
	or 1V835444	end for #8 lead Reference Part P 1 (Assembly used only in TK190) special purpose: Control Panel to Fuse Block and Ground; includes: 30A16396 CABLE, power: single conductor; rubber covered; #8 ga. stranded; one 6-1/2' and one 8' length required 29K824454 CONNECTOR, terminal: closed end for 5/16" diameter stud; other end for #8 lead 29K824434 CONNECTOR, terminal: closed end for #10 diameter stud; other end for #8 lead Reference part P 1 (Assembly used only in TK191)
XF 1	67B83859	<u>FUSEHOLDER,</u> Single fuse mounting; rectangular ceramic base; chassis mounted; for 3" long x 13/16" diameter fuse; used only in model TK190
or	67K892616	Single fuse mounting; rectangular porcelain base; chassis mounted for 2" long x 9/16" diameter fuse; used only in model TK191

- TK163 Chassis Mounting Plates Kit

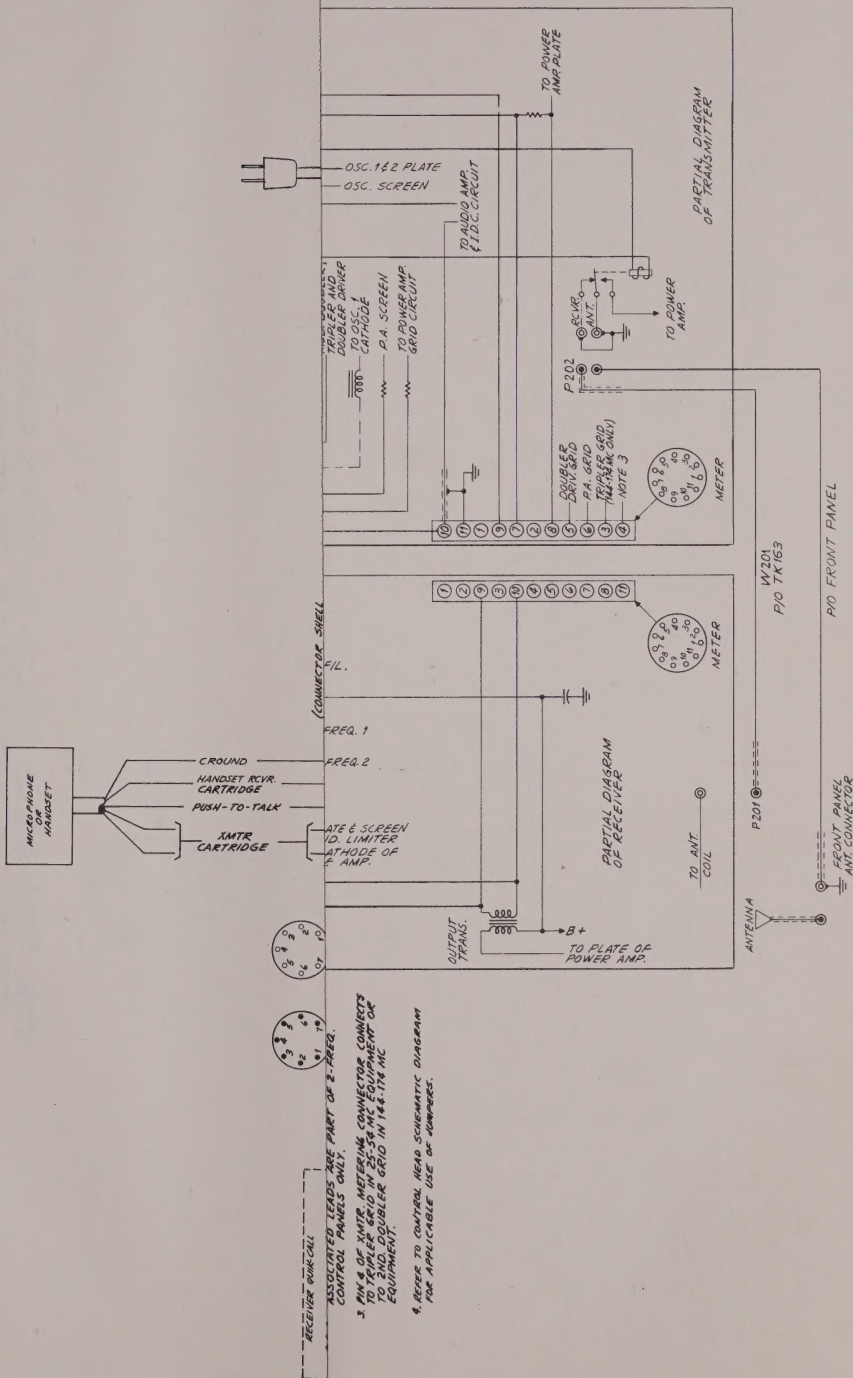
P 201	28K474006	<u>CONNECTOR, Plug:</u> male; single contact; round bakelite wafer insulator; cable mounted; connects to Receiver Antenna Coil Connector; p/o W 201
P 202		Same as P 201 except connects to Transmitter Receiver Relay Connector; p/o W 201
W 201	1K800193	<u>LINE, RF:</u> Transmission: coaxial; Transmitter Relay Receiver Connector to Receiver Antenna Coil Connector; includes: 30K475378 CABLE, RF: coaxial; RG-58A/U; 22" length required Includes reference parts P 201 and P 202, see separate listing

REFER TO INDIVIDUAL SCHEMATIC FOR COMPLETE DETAIL OF EACH CHASSIS



REFER TO INDIVIDUAL SCHEMATIC FOR COMPLETE DETAIL OF EACH CHASSIS

AC UTILITY STATION WITH PROVISION FOR QUIK-CALL INTERCABLING DIAGRAM



MOTOROLA
PART NO. 63E836072
ISSUE - O 11/55-CP

INTERCABLING DIAGRAM PARTS LIST

Model D41GGV Series Mobile Stations

NOTE

This Parts List is arranged by Kits. When ordering replacement parts specify part number, description, schematic diagram number, diagram issue and reference symbol of part.

Reference:
Intercabling Diagram
63E836073

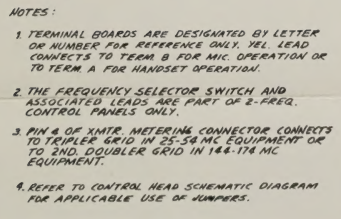
- TK190 Cable Kit (6Volt)
TK191 Cable Kit (12Volt)

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
F 1	65K830314	<u>FUSE, Cartridge:</u> one time; paper; 40 ampere; 250 V; 3" long x 13/16" diameter; used only in model TK190
or	65K52482	one time; paper; 20 ampere; 250 V; 2" long x 9/16" diameter; used only in model TK191
P 1	9B834756	<u>CONNECTOR, Plug:</u> female; 6 contact; polarized; rectangular molded black phenolic base; includes SHELL, connector cable mounted
W 1	1V835443	<u>LEAD, Electrical:</u> used only in model TK190; includes: 30A16396 CABLE, power single conductor; #8 ga.; stranded; rubber insulated; black cotton outer wrap; 24" length required 29K824454 CONNECTOR, terminal: closed end for 5/16" diameter; stud; other end for #8 lead 29K835302 CONNECTOR, terminal: closed end for 1/4" diameter; stud; other end for #8 lead used only in model TK191; includes: 30A16396 CABLE, power: single conductor; #8 ga.; stranded; rubber insulated; black cotton outer wrap; 24" length required 29K824454 CONNECTOR, terminal: closed end for 5/16" diameter; stud; other end for #8 lead 29K824434 CONNECTOR, terminal: closed end for #10 diameter stud; other end for #8 lead
W 2	1V835442	<u>CABLE ASSEMBLY, special purpose:</u> Control Panel to Fuse Block and Ground; includes: 30A16396 CABLE, power: single conductor; rubber covered; #8 ga. stranded; one 6-1/2' and one 8' length required 29K824454 CONNECTOR, terminal: closed

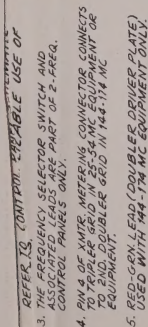
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
	or 1V835444	end for 5/16" diameter stud; other end for #8 lead 29K835302 CONNECTOR, terminal: closed end for 1/4" diameter stud; other end for #8 lead Reference Part P 1 (Assembly used only in TK190) special purpose: Control Panel to Fuse Block and Ground; includes: 30A16396 CABLE, power: single conductor; rubber covered; #8 ga. stranded; one 6-1/2' and one 8' length required 29K824454 CONNECTOR, terminal: closed end for 5/16" diameter stud; other end for #8 lead 29K824434 CONNECTOR, terminal: closed end for #10 diameter stud; other end for #8 lead Reference Part P 1 (Assembly used only in TK191)
XF 1	67B83859	<u>FUSEHOLDER,</u> Single fuse mounting; rectangular ceramic base; chassis mounted for 3" long x 13/16" diameter fuse; used only in model TK190
or	67K892616	Single fuse mounting; rectangular porcelain base; chassis mounted; for 2" long x 9/16" diameter fuse; used only in model TK191

- TK163 Chassis Mounting Plates Kit

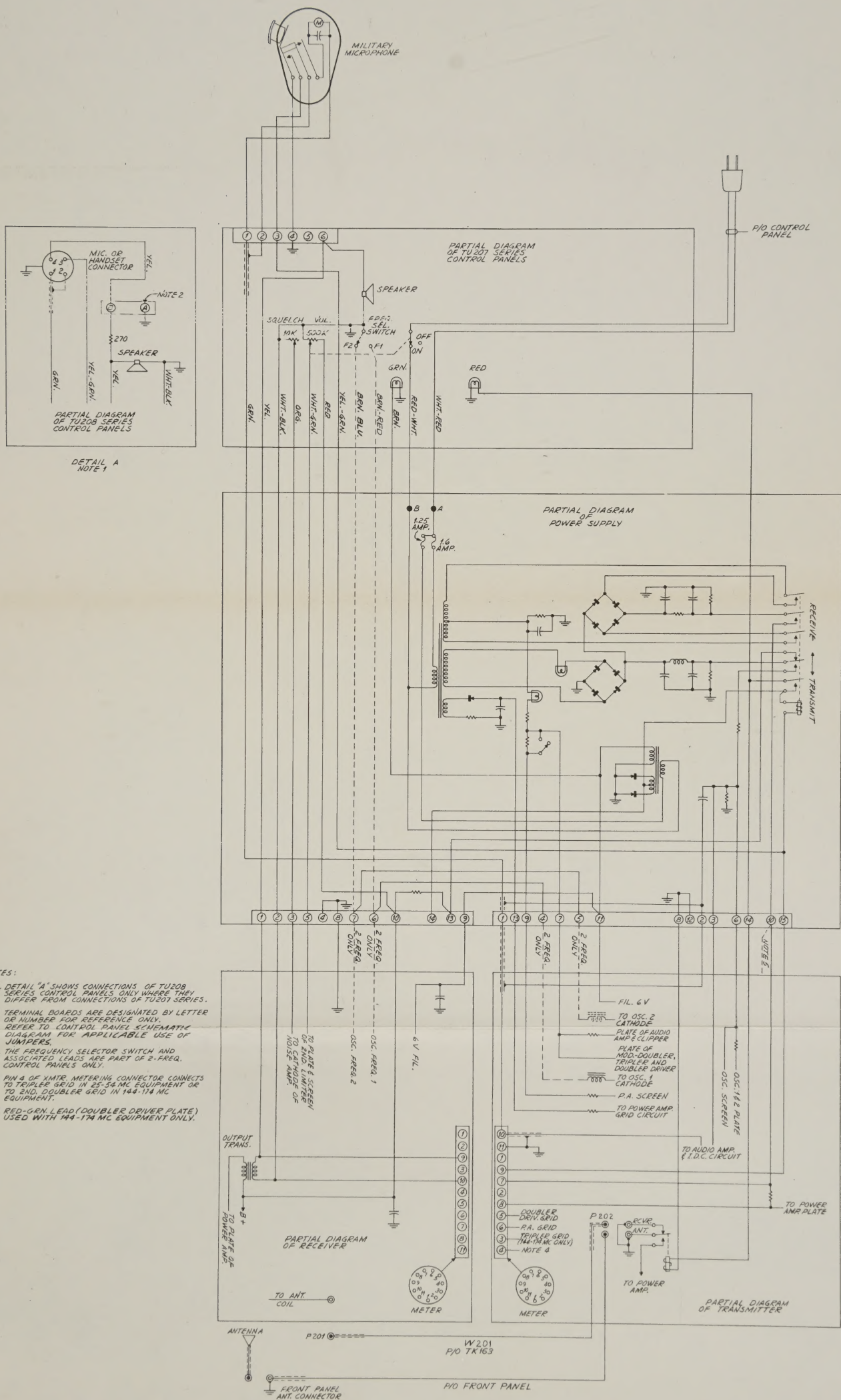
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
P 201	28K474006	<u>CONNECTOR, Plug:</u> male; single contact; round bakelite wafer insulated; cable mounted; connects to Receiver Antenna Coil Connector; p/o W 201
P 202		Same as P 101 except connects to Transmitter Receiver Relay Connector; p/o W 201
W 201	1K800193	<u>LINE, RF:</u> Transmission: coaxial; Transmitter Relay Receiver Connector to Receiver Antenna Coil Connector; includes: 30K475378 CABLE, RF: coaxial; RG-58A/U; 22" length required Includes reference parts P 201 and P 202, see separate listing

AC UTILITY STATION
WITH PROVISION FOR QUIK-CALL
INTERCABLING DIAGRAM

REFER TO INDIVIDUAL SCHEMATIC
FOR COMPLETE DETAIL OF EACH CHASSIS



REFER TO INDIVIDUAL SCHEMATIC
FOR COMPLETE DETAIL OF EACH CHASSIS



INTERCABLING DIAGRAM PARTS LIST

Model T41GGV Series Mobile Stations

NOTE

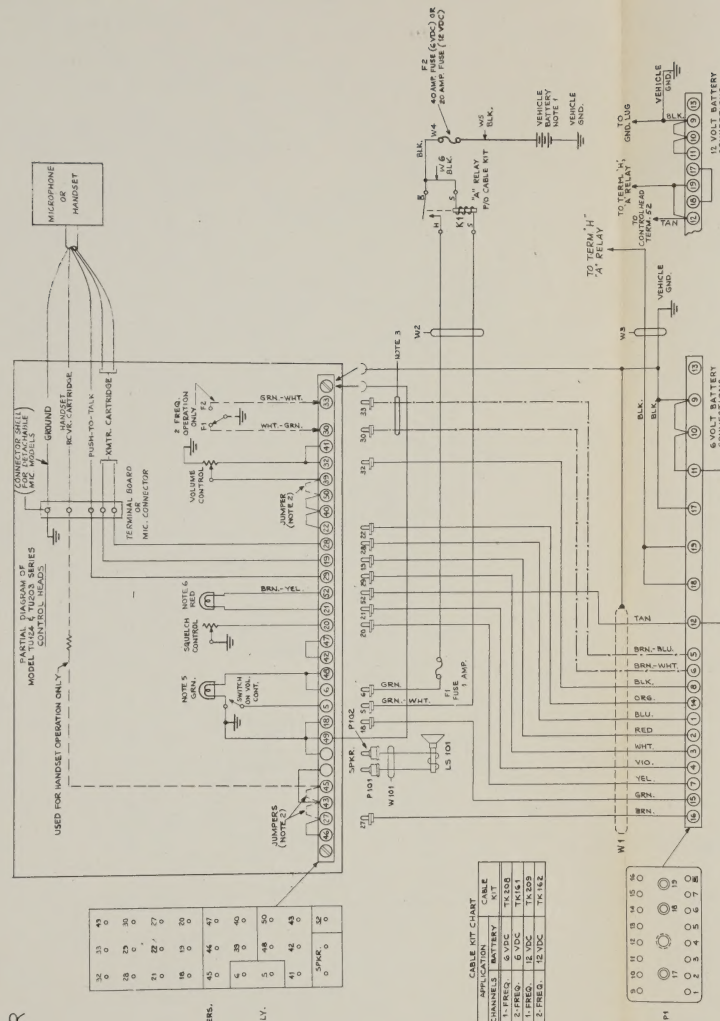
This Parts List is arranged by kits. When ordering replacement parts specify part number, description, schematic diagram number, diagram issue and reference symbol of part.

Reference:
Intercabling Diagram
63E831705

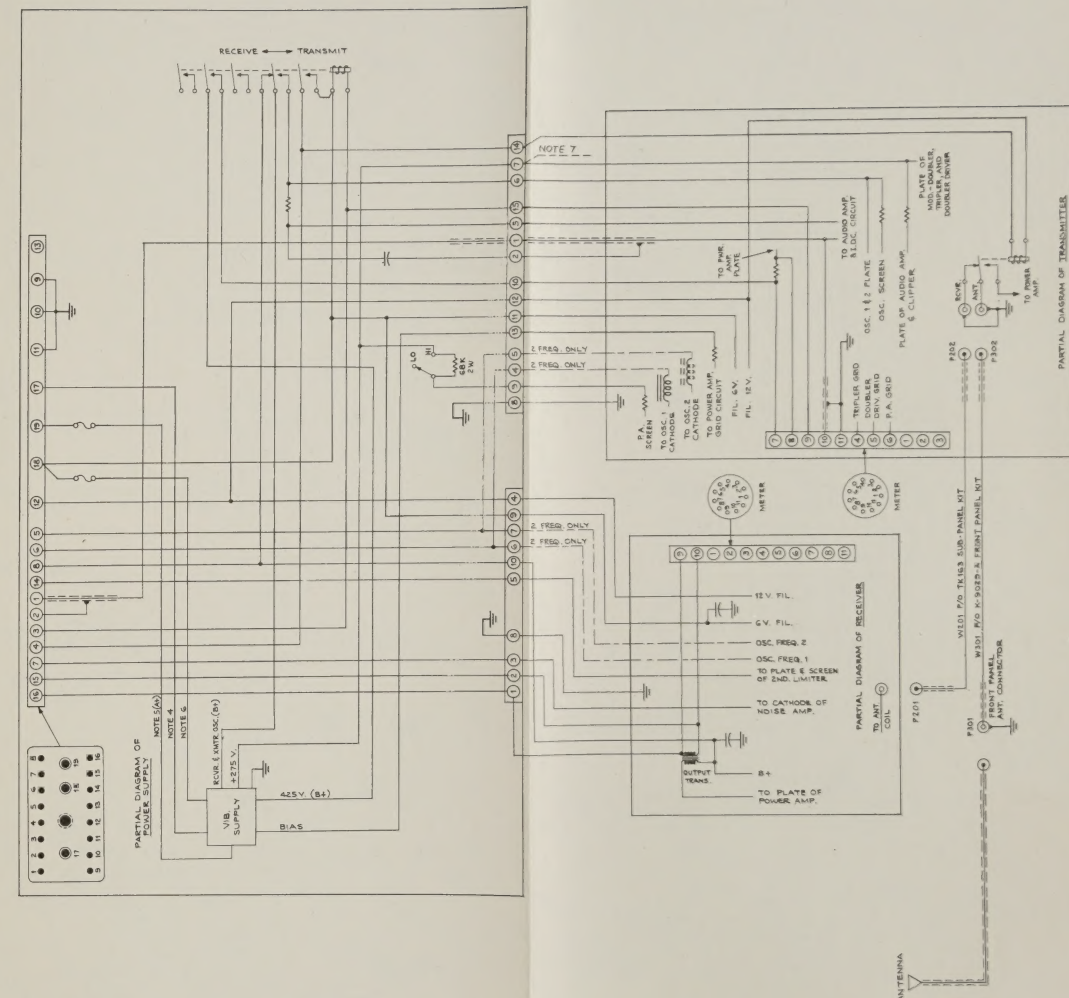
TK208 (6Volt) and TK209 (12Volt) 1-Freq. Cable Kit
TK161 (6Volt) and TK162 (12Volt) 2-Freq. Cable Kit

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
F 1	65K52281	FUSE, Cartridge: one time; glass; 1 ampere; 250 V; 1-1/4" long x 1/4" diameter; p/o W 2
F 2	65K830314	one time; paper; 40 ampere; 250 V; 3" long x 13/16" diameter; used only on TK161 and TK208
or	65K52482	one time; paper; 20 ampere; 250 V; 2" long x 9/16" diameter; used only on TK162 and TK209
K 1	59B880283	RELAY, Armature: 6 VDC; contact arrangement, 1 form "A"; used only on TK161 and TK208
or	59K813674	12 VDC; contact arrangement, 1 form "A"; used only on TK162 and TK209
1	9C801050	CONNECTOR, Plug: female; 19 contact; polarized; rectangular; molded mica filled phenolic base; cable mounted; connects to Power Supply; does not include the following component parts which must be ordered separately: 15B800676 SHELL, connector 15B800674 COVER, connector shell 14A800673 INSULATOR, connector shell; small 14B800678 INSULATOR, connector shell; large 42A800667 CLAMP, cable 42A800669 CLAMP, cable 4A11722 WASHER, "C" 4A800671 WASHER 3B800681 SCREW, connector retaining; 1 required 3S7209 SCREW, 6-32 x 1/8; 2 required 3S7362 SCREW, 6-32 x 1/2; 2 required
W 1	1V831617	CABLE ASSEMBLIES, Special purpose: Power Supply to Control Head; includes: 30B830032 CABLE, special purpose: 12 conductor; 17 ft. length required 29K890418 CONNECTOR, plug; male; single contact; pin type; cable mounted; coded #18 29K890419 Same as 29K890418 except coded #19 29K890420 Same as 29K890418 except coded #20

REFER TO INDIVIDUAL SCHEMATICS FOR COMPLETE DETAILS OF EACH UNIT



NOTES:
1. REFER TO OR OTHER NEGATIVE OF POSITIVE GROUP.
2. REFER TO APPLICABLE CONTROL HEAD SCHEMATIC DIAGRAM FOR USE OF JUMPS.
3. 50% DISBURSED CABLE KIT LEADS PART OF 2-FREQUENCY CABLE KITS ONLY.
4. 14K OR 14V, DEPENDING ON PRIMARY POWER.
5. 14K OR 14V, DEPENDING ON PRIMARY POWER.
6. 14K OR 14V, DEPENDING ON PRIMARY POWER.
7. 14K OR 14V, DEPENDING ON PRIMARY POWER.



MOTOROLA PART No.	DESCRIPTION
	<u>KIT,</u> 56A835806 ENVELOPE; includes printed on instructions (Used in 12 volt installation only for GREEN "Power On" indicator. To be installed in the Control Head at time of installation.) Assembly used only with TK162 or TK209 Cable Kit

assis Mounting Plates Kit

8K474006	<u>CONNECTOR, Plug:</u> male; single contact; cylindrical; round bakelite wafer insulator; cable mounted; connects to Receiver Antenna Coil Connector; p/o W 201 Same as P 201 except connects to Transmitter Relay Receiver Connector; p/o W 201
K800193	<u>LINE, RF:</u> Transmission: coaxial; Transmitter Relay Receiver Connector to Receiver Antenna Coil Connector; includes: 30K475378 CABLE, RF: coaxial RG-58A/U; 22" length required; Reference parts P 201 and P 202, see separate listing

Front Panel Kit (Rear Mtg.)

A85615	<u>CONNECTORS, Plug:</u> female; single contact; cylindrical; molded round mica filled bakelite insulator; square metal mounting base; cable mounted; does not include 15A483599
8K474006	SHELL, connector; which must be ordered separately; connects to Front Panel Antenna Connector; p/o W 301 male; single contact; cylindrical; round bakelite wafer insulator; cable mounted; connects to Transmitter Relay Antenna Connector; p/o W 301
V813547	<u>LINE, RF:</u> Transmission: coaxial; Transmitter Relay Antenna Connector to Front Panel Antenna Connector; includes: 30K475378 CABLE, RF: coaxial; RG-58A/U; 5-1/2" length required. Reference parts P 301 and P 302, see separate listing

Speaker (Firewall Mtg.)

50D844383	<u>SPEAKER,</u> PM Dynamic; 3.2 ohm impedance; 5"
9K5405	<u>CONNECTOR, Plug:</u> male; single contact; pin type; round molded phenolic base; coded BLACK; cable mounted; p/o W 101; connects to control head Same as P 101.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
W 101	1V844385	<u>CABLE ASSEMBLY,</u> Special purpose: Speaker to Control Head; includes: 30A76858 CABLE, special purpose; 2 conductor; rubber covered; 8 ft. length required or 30K77108 CABLE, special purpose; 2 conductor; rubber covered; 8 ft. length required Reference parts P101 and P 101, see separate listing

INTERCABLING DIAGRAM PARTS LIST

Model T41GGV Series Mobile Stations

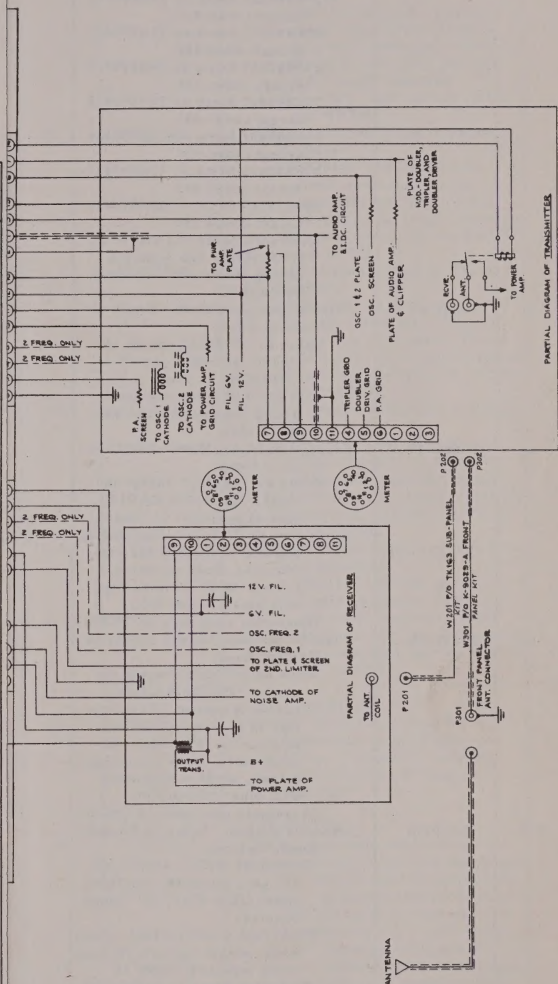
NOTE

This Parts List is arranged by kits. When ordering replacement parts specify part number, description, schematic diagram number, diagram issue and reference symbol of part.

Reference:
Intercabling Diagram
63E839323

1. TK208 (6Volt) and TK209 (12Volt) 1-Freq. Cable Kit
TK161 (6Volt) and TK162 (12Volt) 2-Freq. Cable Kit

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
F 1	65K52281	FUSES, Cartridge: one time; glass; 1 ampere; 250 V; 1-1/4" long x 1/4" diameter; p/o W 2
F 2	65K830314	one time; paper; 40 ampere; 250 V; 3" long x 13/16" diameter; used only on TK161 and TK208
or	65K52482	one time; paper; 20 ampere; 250 V; 2" long x 9/16" diameter; used only on TK162 and TK209
K 1	59B880283	RELAY, Armature: 6 VDC; contact arrangement, 1 form "A"; used only on TK161 and TK208
or	59K813674	12 VDC; contact arrangement, 1 form "A"; used only on TK162 and TK209
P 1	9C801050	CONNECTOR, Plug: female; 19 contact; polarized; rectangular; molded; mica filled phenolic base; cable mounted; connects to Power Supply; does not include the following component parts which must be ordered separately: 15B800676 SHELL, connector 15B800674 COVER, connector shell 14A800673 INSULATOR, connector shell; small 14B800678 INSULATOR, connector shell; large 42A800667 CLAMP, cable 42A800699 CLAMP, cable 4A11722 WASHER, "C" 4A800671 WASHER 3B800681 SCREW, connector retaining; 1 required 3S7209 SCREW, 6-32 x 1/8; 2 required 3S7362 SCREW, 6-32 x 1/2; 2 required
W 1	1V831617	CABLE ASSEMBLIES, Special purpose: Power Supply to Control Head; includes: 30B830032 CABLE, special purpose: 12 conductor; 17 ft. length required 29K890418 CONNECTOR, plug; male; single contact; pin type; cable mounted; coded #18 29K890419 Same as 29K890418 except coded #19 29K890420 Same as 29K890418 except coded #20 29K890421 Same as 29K890418 except coded #21



REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		<u>CABLE ASSEMBLIES.</u> 29K890421 Same as 29K890418 except coded #21 29K890422 Same as 29K890418 except coded #22 29K890427 Same as 29K890418 except coded #27 29K890428 Same as 29K890418 except coded #28 29K890429 Same as 29K890418 except coded #29 29K890430 Same as 29K890418 except coded #30 29K890432 Same as 29K890418 except coded #32 29K890433 Same as 29K890418 except coded #33 29K835340 Same as 29K890418 except coded #52 Reference parts P 1 and W 3 (1V831618), see separate listing (Assembly used only on TK161) Special purpose: Power Supply to Control Head: Same as 1V831617 except includes reference part W 3 (1V832062) in place of W 3 (1V831618), see separate listing (Assembly used only on TK162) Special purpose: Power Supply to Control Head: Same as 1V831617 except includes 30B893814 CABLE, special purpose; 10 conductor; 17 ft. length required in place of 30B830032 (12 conductors). Does not include 2-freq. leads terminating with pins #30 and #33. (Assembly used only on TK208) Special purpose: Power Supply to Control Head: Same as 1V832061 except includes 30B893814 Cable, special purpose; 10 conductor; 17 ft. length required, in place of 30B830032 (12 conductor). Does not include 2-freq. leads terminating with pins #30 and #33. (Assembly used only on TK209) Special Purpose: Relay to Control Head; includes: 10M488285 WIRE, electrical: #20 ga.; stranded; insulated; coded GRN-WHT; 50" length required 29K890405 CONNECTOR, plug: male; single contact; pin type; cable mounted; coded #5 29K890406 Same as 29K890405 except coded #6 Reference parts F 1 and XF 1, see separate listing (Assembly used on TK161, TK162, TK208 and TK209) Special purpose: Relay to Power Supply; p/o W 1 (1V831617); includes: 30K825602 CABLE, power: single conductor; #6 ga.; stranded; insulated; coded BLACK; one 17 ft. and one 4 ft. length required (Assembly used only on TK161 and TK208)
or	1V832061	
or	1V836537	
or	1V836538	
W 2	1V830178	
W 3	1V831618	

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
or	1V832062	<u>CABLE ASSEMBLIES.</u> Special purpose: Relay to Power Supply; p/o W 1 (1V832061); includes: 30K831572 CABLE, power: single conductor; #10 ga.; stranded; insulated; coded BLACK; one 17 ft. and one 4 ft. length required (Assembly used only on TK162 and TK209) Special purpose: Fuse to Relay; includes: 30K825602 CABLE, power: single conductor; #6 ga.; stranded; insulated; coded BLACK; 3 ft. length required (Assembly used only on TK161 and TK208) Special purpose: Fuse to Relay; includes: 30K831572 CABLE, power: single conductor; #10 ga.; stranded; insulated; coded BLACK; 3 ft. length required (Assembly used only on TK162 and TK209) Special purpose: Battery to Fuse; includes: 30K825602 CABLE, power: single conductor; #6 ga.; stranded; insulated; coded BLACK; 2 ft. length required (Assembly used only on TK161 and TK208) Special purpose: Battery to Resistor; includes: 30K831572 CABLE, power: single conductor; #10 ga.; stranded; insulated; coded BLACK; 2 ft. length required (Assembly used only on TK162 and TK209) <u>LEAD.</u> Electrical: Relay Jumper; includes Wire, electrical; single conductor; #12 ga.; stranded; insulated; coded BLACK; 4" length required <u>FUSEHOLDERS.</u> Cable mounted; male and female retainer; single fuse mounting; 50" long overall including #18 ga.; stranded; insulated; coded GREEN leads on both ends of Fuseholder; for 1-1/4" long x 1/4" diameter fuse; p/o W 2 Chassis mounted; clip type; single fuse mounting; porcelain base; for 3" long x 13/16" diameter fuse; used only on TK161 and TK208 or 67K892616 Chassis mounted; clip type; single fuse mounting; porcelain base; for 2" long x 9/16" diameter fuses; used only on TK162 and TK209
W 4	1V831622	
or	1V832065	
W 5	1V831619	
or	1V832063	
W 6	1V830177	
XF 1	9K830037	
XF 2	67B83859	
or	67K892616	
NON-REFERENCED PARTS LIST		
	1V835805	<u>KIT.</u> Bulb; includes: 65A84419 LAMP, incandescent; 12-16 v; 2 ampere; miniature single contact bayonet base; tubular glass

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		<u>KIT.</u> 56A835806 ENVELOPE; includes printed on instructions (Used in 12 volt installation only for GREEN "Power On" indicator. To be installed in the Control Head at time of installation.) Assembly used only with TK162 or TK209 Cable Kit
2. TK163 Chassis Mounting Plates Kit		
P 201	28K474006	<u>CONNECTOR, Plug:</u> male; single contact; cylindrical; round bakelite wafer insulator; cable mounted; connects to Receiver Antenna Coil Connector; p/o W 201 Same as P 201 except connects to Transmitter Relay Receiver Connector; p/o W 201
P 202		
W 201	1K800193	<u>LINE, RF:</u> Transmission: coaxial; Transmitter Relay Receiver Connector to Receiver Antenna Coil Connector; includes: 30K475378 CABLE, RF: coaxial RG-58A/U; 22" length required; Reference parts P 201 and P 202, see separate listing
3. K-9029-A Front Panel Kit (Rear Mtg.)		
P 301	9A85615	<u>CONNECTORS, Plug:</u> female; single contact; cylindrical; molded round mica filled bakelite insulator; square metal mounting base; cable mounted; does not include 15A483599 SHELL, connector; which must be ordered separately; connects to Front Panel Antenna Connector; p/o W 301
P 302	28K474006	male; single contact; cylindrical; round bakelite wafer insulator; cable mounted; connects to Transmitter Relay Antenna Connector; p/o W 301
W 301	1V813547	<u>LINE, RF:</u> Transmission: coaxial; Transmitter Relay Antenna Connector to Front Panel Antenna Connector; includes: 30K475378 CABLE, RF: coaxial; RG-58A/U; 5-1/2" length required. Reference parts P 301 and P 302, see separate listing
4. TU324A Speaker (Firewall Mtg.)		
LS 101	50D844383	<u>SPEAKER,</u> PM Dynamic; 3.2 ohm impedance; 5"
P 101	29K5405	<u>CONNECTOR, Plug:</u> male; single contact; pin type; round molded phenolic base; coded BLACK; cable mounted; p/o W 101; connects to control head Same as P 101.
P 102		

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
W 101	1V844385	<u>CABLE ASSEMBLY,</u> Special purpose: Speaker to Control Head; includes: 30A76858 CABLE, special purpose; 2 conductor; rubber covered; 8 ft. length required or 30K77108 CABLE, special purpose; 2 conductor; rubber covered; 8 ft. length required Reference parts P101 and P 101, see separate listing

INTERCABLING DIAGRAM PARTS LIST

Model T41GGV Series Mobile Stations

NOTE

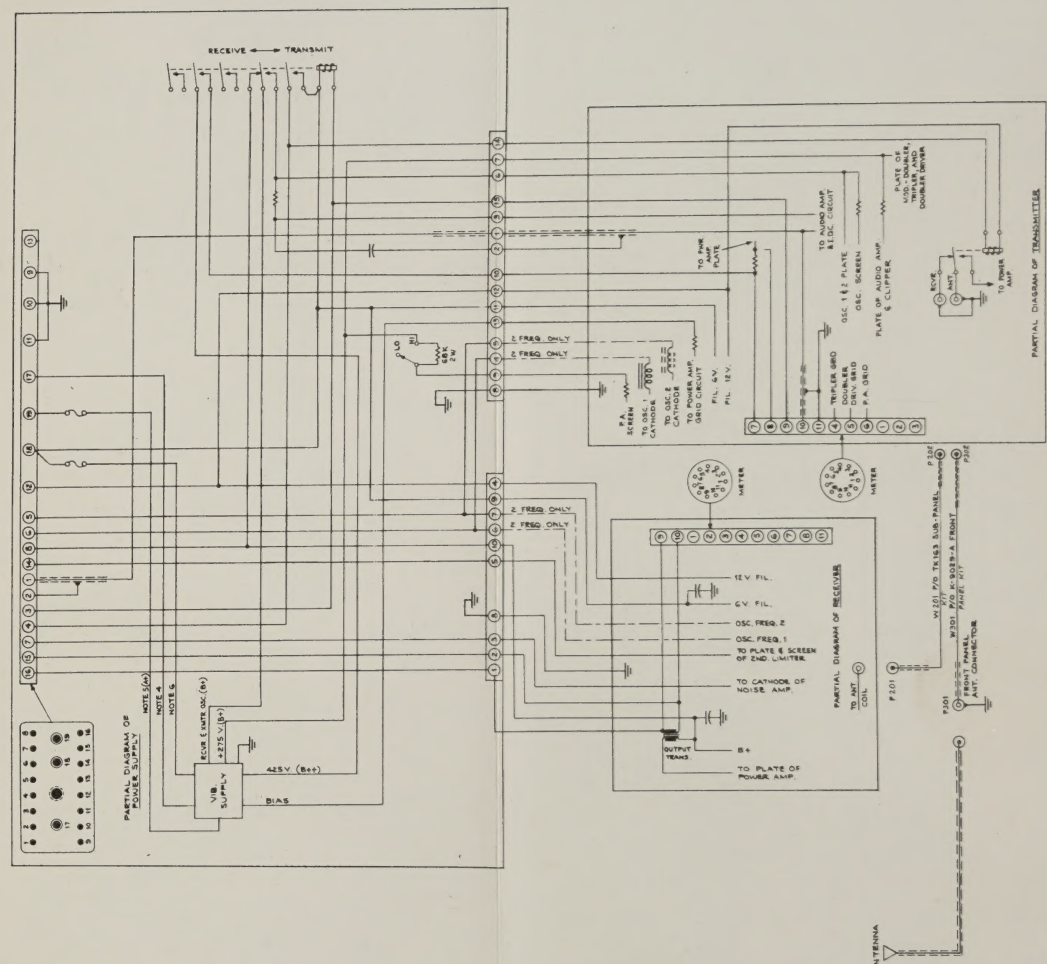
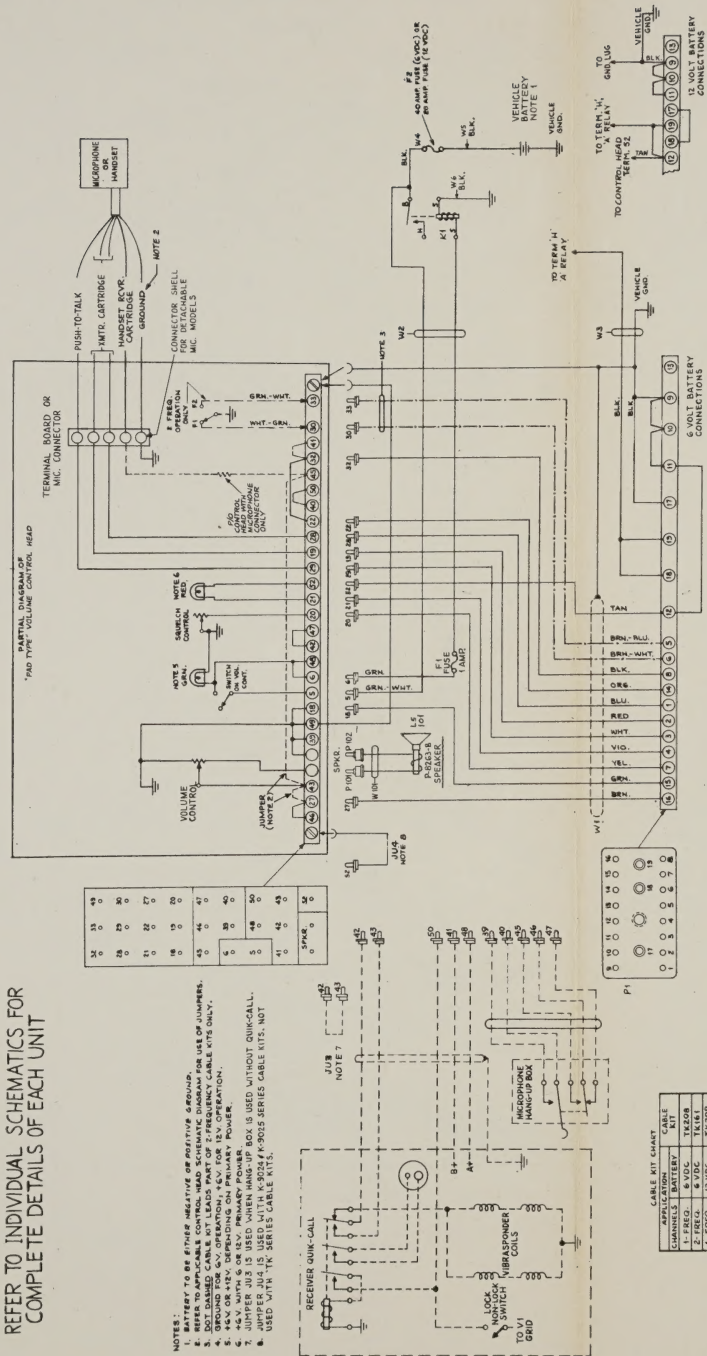
This Parts List is arranged by kits. When ordering replacement parts specify part number, description, schematic diagram number, diagram issue and reference symbol of part.

Reference:
Intercabling Diagram
63E839323

1. TK208 (6Volt) and TK209 (12Volt) 1-Freq. Cable Kit
TK161 (6Volt) and TK162 (12Volt) 2-Freq. Cable Kit

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
F 1	65K52281	FUSES, Cartridge: one time; glass; 1 ampere; 250 V; 1-1/4" long x 1/4" diameter; p/o W 2
F 2	65K830314	one time; paper; 40 ampere; 250 V; 3" long x 13/16" diameter; used only on TK161 and TK208
or	65K52482	one time; paper; 20 ampere; 250 V; 2" long x 9/16" diameter; used only on TK162 and TK209
K 1	59B880283	RELAY, Armature: 6 VDC; contact arrangement, 1 form "A"; used only on TK161 and TK208
or	59K813674	12 VDC; contact arrangement, 1 form "A"; used only on TK162 and TK209
P 1	9C801050	CONNECTOR, Plug: female; 19 contact; polarized; rectangular; molded; mica filled phenolic base; cable mounted; connects to Power Supply; does not include the following component parts which must be ordered separately: 15B800676 SHELL, connector 15B800674 COVER, connector shell 14A800673 INSULATOR, connector shell; small 14B800678 INSULATOR, connector shell; large 42A800667 CLAMP, cable 42A800699 CLAMP, cable 4A11722 WASHER, "C" 4A800671 WASHER 3B800681 SCREW, connector retaining; 1 required 3S7209 SCREW, 6-32 x 1/8; 2 required 3S7362 SCREW, 6-32 x 1/2; 2 required
W 1	1V831617	CABLE ASSEMBLIES. Special purpose: Power Supply to Control Head; includes: 30B830032 CABLE, special purpose; 12 conductor; 17 ft. length required 29K890418 CONNECTOR, plug; male; single contact; pin type; cable mounted; coded #18 29K890419 Same as 29K890418 except coded #19 29K890420 Same as 29K890418 except coded #20 29K890421 Same as 29K890418 except coded #21

REFER TO INDIVIDUAL SCHEMATICS FOR COMPLETE DETAILS OF EACH UNIT



MOTOROLA PART No.	DESCRIPTION
	<u>KIT,</u> 56A835806 ENVELOPE; includes printed on instructions (Used in 12 volt installation only for GREEN "Power On" indicator. To be installed in the Control Head at time of installation.) Assembly used only with TK162 or TK209 Cable Kit

Chassis Mounting Plates Kit

28K474006	<u>CONNECTOR, Plug:</u> male; single contact; cylindrical; round bakelite wafer insulator; cable mounted; connects to Receiver Antenna Coil Connector; p/o W 201 Same as P 201 except connects to Transmitter Relay Receiver Connector; p/o W 201
1K800193	<u>LINE, RF:</u> Transmission: coaxial; Transmitter Relay Receiver Connector to Receiver Antenna Coil Connector; includes: 30K475378 CABLE, RF: coaxial RG-58A/U; 22" length required; Reference parts P 201 and P 202, see separate listing

9-A Front Panel Kit (Rear Mtg.)

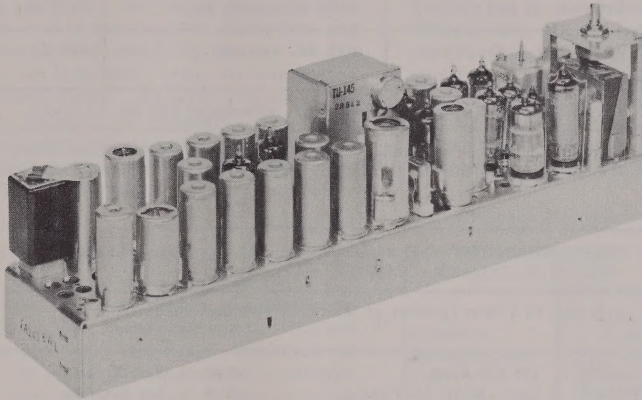
9A85615	<u>CONNECTOR, Plug:</u> female; single contact; cylindrical; molded round mica filled bakelite insulator; square metal mounting base; cable mounted; does not include 15A483599 SHELL, connector; which must be ordered separately; connects to Front Panel Antenna Connector; p/o W 301
28K474006	male; single contact; cylindrical; round bakelite wafer insulator; cable mounted; connects to Transmitter Relay Antenna Connector; p/o W 301
1V813547	<u>LINE, RF:</u> Transmission: coaxial; Transmitter Relay Antenna Connector to Front Panel Antenna Connector; includes: 30K475378 CABLE, RF: coaxial RG-58A/U; 5-1/2" length required. Reference parts P 301 and P 302, see separate listing

A Speaker (Firewall Mtg.)

50D844383	<u>SPEAKER,</u> PM Dynamic; 3.2 ohm impedance; 5"
29K5405	<u>CONNECTOR, Plug:</u> male; single contact; pin type; round molded phenolic base; coded BLACK; cable mounted p/o W 101; connects to control head Same as P 101

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
W 101	1V844385	<u>CABLE ASSEMBLY.</u> Special purpose: Speaker to Control Head; includes: 30A76858 CABLE, special purpose; 2 conductor; rubber covered; 8 ft. length required or 30K77108 CABLE, special purpose; 2 conductor; rubber covered; 8 ft. length required Reference parts P 101 and P 102, see separate listing

SENSICON "G" RECEIVER



MODEL TA140BW RECEIVER CHASSIS

MODEL DESIGNATION	CHANNELS	FILTER	APPLICATION
TA140BS	1-Freq.	K-9240	30 Kc. Channel Spacing
TA140BS-R2	2-Freq.	K-9240	30 Kc. Channel Spacing
TA140BW	1-Freq.	TU145	60 Kc. Channel Spacing
TA140BW-R2	2-Freq.	TU145	60 Kc. Channel Spacing
TA140BX	1-Freq.	K-9242	120 Kc. Channel Spacing
TA140BX-R2	2-Freq.	K-9242	120 Kc. Channel Spacing

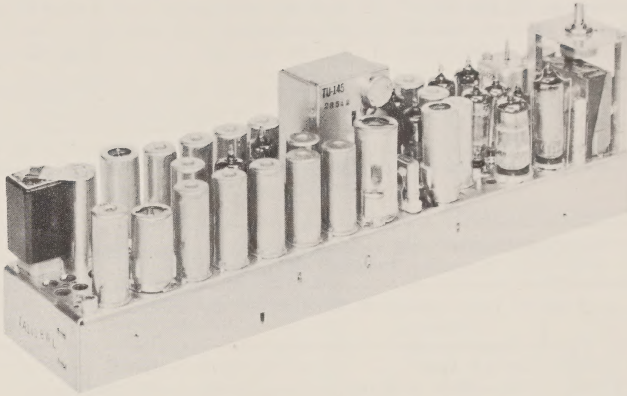
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		<u>CABLE ASSEMBLIES.</u> 29K890422 Same as 29K890418 except coded #22 29K890427 Same as 29K890418 except coded #27 29K890428 Same as 29K890418 except coded #28 29K890429 Same as 29K890418 except coded #29 29K890430 Same as 29K890418 except coded #30 29K890432 Same as 29K890418 except coded #32 29K890433 Same as 29K890418 except coded #33 29K835340 Same as 29K890418 except coded #52 Reference parts P 1 and W 3 (1V831618), see separate listing (Assembly used only on TK161)
or	1V832061	Special purpose: Power Supply to Control Head: Same as 1V831617 except includes reference part W 3 (1V832062) in place of W 3 (1V831618), see separate listing (Assembly used only on TK162)
or	1V836537	Special purpose: Power Supply to Control Head: Same as 1V831617 except includes 30B893814 CABLE, special purpose; 10 conductor; 17 ft. length required in place of 30B830032 (12 conductors), Does not include 2-freq. leads terminating with pins #30 and #33. (Assembly used only on TK208)
or	1V836538	Special purpose: Power Supply to Control Head: Same as 1V832061 except includes 30B893814 Cable, special purpose; 10 conductor; 17 ft. length required, in place of 30B830032 (12 conductor). Does not include 2-freq. leads terminating with pins #30 and #33. (Assembly used only on TK209)
W 2	1V830178	Special purpose: Relay to Control Head; includes: 10M488285 WIRE, electrical; #20 ga.; stranded; insulated; coded GRN-WHT; 50" length required 29K890405 CONNECTOR, plug; male; single contact; pintype; cable mounted; coded #5 29K890406 Same as 29K890405 except coded #6 Reference parts F 1 and XF 1, see separate listing (Assembly used on TK161, TK162, TK208 and TK209)
W 3	1V831618	Special purpose: Relay to Power Supply; p/o W 1 (1V831617); includes: 30K825602 CABLE, power; single conductor; #6 ga.; stranded; insulated; coded BLACK; one 17 ft. and one 4 ft. length required (Assembly used only on TK161 and TK208)

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
or	1V832062	<u>CABLE ASSEMBLIES.</u> Special purpose: Relay to Power Supply; p/o W 1 (1V832061); includes: 30K831572 CABLE, power; single conductor; #10 ga.; stranded; insulated; coded BLACK; one 17 ft. and one 4 ft. length required (Assembly used only on TK162 and TK209)
W 4	1V831622	Special purpose: Fuse to Relay; includes: 30K825602 CABLE, power; single conductor; #6 ga.; stranded; insulated; coded BLACK; 3 ft. length required (Assembly used only on TK161 and TK208)
or	1V832065	Special purpose: Fuse to Relay; includes: 30K831572 CABLE, power; single conductor; #10 ga.; stranded; insulated; coded BLACK; 3 ft. length required (Assembly used only on TK162 and TK209)
W 5	1V831619	Special purpose: Battery to Fuse; includes: 30K825602 CABLE, power; single conductor; #6 ga.; stranded; insulated; coded BLACK; 2 ft. length required (Assembly used only on TK161 and TK208)
or	1V832063	Special purpose: Battery to Resistor; includes: 30K831572 CABLE, power; single conductor; #10 ga.; stranded; insulated; coded BLACK; 2 ft. length required (Assembly used only on TK162 and TK209)
W 7	1V830177	<u>LEAD, Electrical:</u> Relay Jumper; includes Wire, Electrical; single conductor; #12 ga.; stranded; insulated; coded BLACK; 4" length required
XF 1	9K830037	<u>FUSEHOLDERS.</u> Cable mounted; male and female retainer; single fuse mounting; 50" long overall including #18 ga.; stranded; insulated; coded GREEN leads on both ends of Fuseholder; for 1-1/4" long x 1/4" diameter fuse; p/o W 2
XF 2	67B83859	Chassis mounted; clip type; single fuse mounting; porcelain base; for 3" long x 13/16" diameter fuse; used only on TK161 and TK208
or	67K892616	Chassis mounted; clip type; single fuse mounting; porcelain base; for 2" long x 9/16" diameter fuses; used only on TK162 and TK209
NON-REFERENCED PARTS		
	1V835805	<u>KIT.</u> Bulb; includes: 65A84419 LAMP, incandescent; 12-16 v; 2 ampere; miniature single contact bayonet base; tubular glass

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		<u>KIT.</u> 56A835806 ENVELOPE; includes printed on instructions (Used in 12 volt installation only for GREEN "Power On" indicator. To be installed in the Control Head at time of installation.) Assembly used only with TK162 or TK209 Cable Kit
2. TK153 Chassis Mounting Plates Kit		
P 201	28K474006	<u>CONNECTOR, Plug:</u> male; single contact; cylindrical; round bakelite wafer insulator; cable mounted; connects to Receiver Antenna Coil Connector; p/o W 201
P 202		Same as P 201 except connects to Transmitter Relay Receiver Connector; p/o W 201
W 201	1K800193	<u>LINE, RF:</u> Transmission: coaxial; Transmitter Relay Receiver Connector to Receiver Antenna Coil Connector; includes: 30K475378 CABLE, RF: coaxial RG-58A/U; 22" length required; Reference parts P 201 and P 202, see separate listing
3. K-9329-A Front Panel Kit (Rear Mtg.)		
P 301	9A85615	<u>CONNECTOR, Plug:</u> female; single contact; cylindrical; molded round mica filled bakelite insulator; square metal mounting base; cable mounted; does not include 15A483599 SHELL, connector; which must be ordered separately; connects to Front Panel Antenna Connector; p/o W 301
P 302	28K474006	male; single contact; cylindrical; round bakelite wafer insulator; cable mounted; connects to Transmitter Relay Antenna Connector; p/o W 301
W 301	1V813547	<u>LINE, RF:</u> Transmission: coaxial; Transmitter Relay Antenna Connector to Front Panel Antenna Connector; includes: 30K475378 CABLE, RF: coaxial RG-58A/U; 5-1/2" length required. Reference parts P 301 and P 302, see separate listing
4. TU324A Speaker (Firewall Mtg.)		
LS 101	50D844383	<u>SPEAKER.</u> PM Dynamic; 3.2 ohm impedance; 5"
P 101	29K5405	<u>CONNECTOR, Plug:</u> male; single contact; pin type; round molded phenolic base; coded BLACK; cable mounted p/o W 101; connects to control head
P 102		Same as P 101

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
W 101	1V844385	<u>CABLE ASSEMBLY.</u> Special purpose: Speaker to Control Head; includes: 30A76858 CABLE, special purpose; 2 conductor; rubber covered; 8 ft. length required or 30K77108 CABLE, special purpose; 2 conductor; rubber covered; 8 ft. length required Reference parts P 101 and P 102, see separate listing

SENSICON "G" RECEIVER



MODEL TA140BW RECEIVER CHASSIS

MODEL DESIGNATION	CHANNELS	FILTER	APPLICATION
TA140BS	1-Freq.	K-9240	30 Kc. Channel Spacing
TA140BS-R2	2-Freq.	K-9240	30 Kc. Channel Spacing
TA140BW	1-Freq.	TU145	60 Kc. Channel Spacing
TA140BW-R2	2-Freq.	TU145	60 Kc. Channel Spacing
TA140BX	1-Freq.	K-9242	120 Kc. Channel Spacing
TA140BX-R2	2-Freq.	K-9242	120 Kc. Channel Spacing

MOTOROLA Communications and Electronics Division

Engineering Publications 4501 W. Augusta Blvd. Chicago 51, Illinois

GUARANTEED PERFORMANCE SPECIFICATIONS

BASIC UNIT	TA140BS, TA140BS-R2		TA140BW, TA140BW-R2	TA140BX, TA140BX-R2
MODEL APPLICATION	30 Kc. Channel Spacing		60 Kc. Channel Spacing	120 Kc. Channel Spacing
FREQUENCY RANGE	144-174 Mc.			
PRIMARY POWER SOURCE	6.3 VDC, 12.6 VDC or 117 VAC			
20 DB. QUIETING SENSITIVITY	Less than 0.6 microvolt; 50 ohms RF input impedance.			
SELECTIVITY	-100 db. at ± 18 Kc.	-100 db. at ± 32 Kc.	-100 db. at ± 120 Kc.	
MODULATION ACCEPTANCE	± 5 Kc. at -6 db.	± 15 Kc. at -6 db.	± 15 Kc. at -6 db.	
SPURIOUS RESPONSE	All spurious and image responses are attenuated 100 db. or more.			
TEMPERATURE RANGE AND FREQUENCY STABILITY	Using an oven type crystal, the overall stability is maintained within ± 1 Kc. of center frequency from -30°C. to $+60^{\circ}\text{C.}$ ambient temperature ($+25^{\circ}\text{C.}$ reference).			
SQUELCH	Noise compensated type; adjustable sensitivity; threshold sensitivity 0.18 microvolt. (U.S. Patent No. 2343115, other patents pending.)			
AUDIO OUTPUT	1.5 watt to 3 ohm speaker at less than 10% distortion.			
TUBE COMPLEMENT AND FUNCTION	6AK5 - 1st RF Amp. (1) 6BC5 - Osc.-Mult. (1-Freq.) (2) 6BC5 - Osc.-Mult. (2-Freq.) 6AB4 - 1st Mixer 6BH6 - 1st IF 12AT7 - 2nd Mixer & Osc. 6CB6 - 2nd IF-1 6CB6 - 2nd IF-2 6CB6 - 2nd IF-3 6BH6 - 1st Limiter 6BJ6 - 2nd Limiter 6AL5 - Discriminator 6BH6 - Noise Amplifier 6C4 - Noise Rectifier 12AT7 - Audio & Squelch Amp. 6AQ5 - Audio Output			
NUMBER OF TUNED CIRCUITS	28 including 10 plastic-sealed in Permakay Filter	30 including 12 plastic-sealed in Permakay Filter	21 including 3 plastic-sealed in TRI-K Filter	
	Antenna, RF amplifier, and oscillator-multiplier stages include 7 (1-Freq.) or 8 (2-Freq.) tuned circuits. IF amplifier stages include 11 tuned circuits. IF filter includes remainder of tuned circuits.			
FILTER TYPE	K-9240 Permakay IF filter contains 10 plastic-cast tuned circuits.	TU145 Permakay IF filter contains 12 plastic-cast tuned circuits.	K-9242 TRI-K IF filter contains 3 plastic-cast tuned circuits.	
METERING	A single scale meter may be used with associated rotary selector switches and chassis mounted metering socket to check all circuits essential to tuning and servicing.			
PRIMARY POWER DRAIN	Operate: 7.1 a at 6.3 VDC; 3.6 a at 12.6 VDC; or 44 watts at 117 VAC Muted: 5.0 a at 6.3 VDC; 2.6 a at 12.6 VDC; or 32 watts at 117 VAC			
	Intermittent Drain: Each crystal heater, 0.8 a or 5 watts			
DIMENSIONS	3-1/4" wide x 5-1/4" high x 15" long overall or 19" rack utilizing adaptor chassis			
MOUNTING	10 inch mobile and 15 inch mobile housing			
WEIGHT	5 lbs. 4 ozs.			

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

1. DESCRIPTION

a. Design

The MOTOROLA Model TA140B Series SENSICON "G" Receiver is a dual conversion super-heterodyne FM receiver designed for operation within the 144-174 mc. band. The unit incorporates 15 tubes and 18 tuned circuits excluding the pre-tuned and sealed circuits of the IF wave filter. One RF amplifier, a single 1st IF stage and three 2nd IF stages comprise the basic amplification section of the receiver. Audio detection and amplification are performed by means of two limiter stages, an inductive type discriminator and two audio amplifiers. An AGC circuit is incorporated to maintain a constant input to the limiter stages under varying signal conditions. Noise cancellation is affected by means of a noise compensated type adjustable sensitivity squelch circuit.

MOTOROLA SENSICON "G" units represent a progressive departure from conventional receiver design--a departure which was forced by the extreme technical requirements of adjacent channel operation. The stringent demands of close channel occupancy constitute a challenge which is now successfully met by the amazing performance of these new communications receivers.

b. Application

MOTOROLA 144-174 mc. SENSICON "G" Receivers are available in three basic versions accommodating different channel width requirements. Receivers employing a K-9240 PERMAKAY Filter are expressly used for 30 kc. channel spacing applications. Models of this category provide -100 db. of signal attenuation at ± 18 kc. Receivers employing a TU145 PERMAKAY Filter are expressly used for 60 kc. channel spacing applications. Models of this category provide -100 db. of signal attenuation at ± 32 kc. Receivers employing a K-9242 TRI-K Filter (9-x version) are designed for applications where a -100 db. signal attenuation is not required at less than ± 120 kc.; i.e., for 120 kc. channel spacing applications.

Two-frequency (-R2) models are available in all receiver versions. These receivers are identical to corresponding single-frequency models except for the addition of a second oscillator circuit. The two-frequency receivers are designed for operation with a frequency separation between channels as great as 240 kc. without any

change in nominal performance specifications. The RF circuits of two-frequency models should normally be peaked to the lower frequency.

Refer to the model chart of this section for specific model identification.

Model TA140B Series receivers are designed for diversified mobile and AC utility applications. When a unit is installed in a standard 10 inch width housing, it is wired directly to the power supply and is assembled in the drawer assembly without the aid of an auxiliary adapter. For standard 15 inch width housing installations, the receiver is assembled and connected to an Adapter Chassis. This complete assembly is mounted in the mobile drawer unit and is connected to other chassis of the equipment by means of "plug-in" type cables.

c. Chassis Component

Chassis Designation	Basic Chassis		Coil Kit		Filter			Xtal. Used	
	TU188B	TU188B-R2	TK187	TK187-R2	TU145	K-9240	K-9242	G03	DM-10
TA140BS	X		X			X		X	X
TA140BS-R2		X		X		X		X	2
TA140BW	X		X		X			X	X
TA140BW-R2		X		X	X			X	2
TA140BX	X		X				X	X	X
TA140BX-R2		X		X			X	X	2

NOTES:

X:—Signifies each item included or used with standard models.

2:—Signifies two items used with standard models.

2. PRE-OPERATIONAL NOTES

Before placing the receiver in operation it is advisable to check that the unit is functioning properly. The receiver is tuned and adjusted for its exact operating frequency prior to shipment from the factory. Unless it has been handled roughly while in transit or otherwise abused or tampered with, the unit should require no further

adjustment before placing it in service. If for any reason, it becomes necessary for the receiver to be retuned, the alignment procedure described later in this section outlines the correct procedure. The following preliminary checks may be used to ascertain proper alignment and adjustment of the receiver.

a. Frequency Check

(1) Turn the equipment "on" and allow a 5 minute warm-up period.

(2) Connect a MOTOROLA Portable Test Set to the METER receptacle on the chassis.

(3) Radiate a signal from a transmitter which the receiver is normally intended to receive.

NOTE

Be certain that the remote transmitter is operating on the correct carrier frequency before readjusting the receiver.

(4) Check the discriminator balance against this frequency by placing the meter switch in position -4 or +4.

A zero meter reading indicates the receiver is "on frequency", adjust oscillator trimmer C 110 to obtain this reading.

Future minor adjustments may be made by tuning the oscillator coil only. However, if position 4 is more than ± 1 ua, it will be necessary to adjust the oscillator trimmer.

To check for #2 frequency of a two-frequency receiver, be sure that the frequency selector switch is in FREQ. 2 position and repeat the preceding procedure adjusting C 204 if necessary.

b. Laboratory Sensitivity Check

Quieting signal is that input signal necessary to reduce the output noise at speaker 20 db. Quieting measurements should be made in a well shielded location in the absence of extraneous electrical noise.

This measurement is important in that it indicates in one measurement that the unit is working normally.

The actual measurement is made by observing the noise voltage at the speaker without any carrier at the antenna. Sufficient carrier is then

introduced at the antenna to reduce the output voltage to 1/10 its former value.

To measure the quieting signal accurately, a Model 80 Signal Generator or equivalent, and a MOTOROLA Portable Test Set are required. Employment of a VTVM or db. output meter suitable for accurate measurement of receiver audio output, is also recommended.

(1) Turn the signal generator "on" and stabilize by a "warm-up" period of 1-1/2 to 2 hours.

(2) Connect the meter plug from the Portable Test Set to the meter receptacle on the chassis.

(3) Place the REC-XMTR-0, 50 ua switch in the REC position and the GRID CURRENT-METER-FIELD STRENGTH switch in the METER position on the Test Set.

(4) Connect the signal generator, adjusted to the desired carrier frequency to the antenna input connector using the coaxial lead and 6 db. pad. The exact carrier frequency will be indicated by a zero reading on the test set with the meter switch in position +4 or -4.

(5) Connect the output meter across the voice coil leads (terminals 1 and 2 on the terminal board of the power supply or adapter chassis). Note: If an output meter is not available, the Test Set may be used to measure receiver output by placing the Test Set selector switch in position 8. (Test Set measurements are purely relative and will not constitute actual output level readings).

(6) Turn the SQUELCH control fully counter-clockwise (off).

(7) With no signal input to the receiver (signal generator ATTENUATOR control set for zero output) adjust the VOLUME control on the receiver chassis for 0.5 volts of noise output on the audio output meter. (Adjust for a reading of 10.0 if the test set is used for this measurement.)

(8) Adjust the output level of the signal generator until the receiver audio output is decreased 20 db. (to 0.05 volts on audio output meter) from the reading in step (7). Adjust for a reading of 1.0 if the Test Set is used for this measurement.

(9) Note the setting of the signal generator output control. This value (microvolts) is the 20 db. quieting sensitivity of the receiver.

3. PRE-ALIGNMENT NOTES

Before attempting alignment of the receiver, the following preliminary considerations should be noted.

a. Frequency Calculations

Receiver crystal, IF and/or carrier frequencies may be determined as follows:

$$f_c = \text{carrier frequency}$$

$$f_{01} = \text{1st oscillator crystal frequency (dependent on } f_c)$$

$$f_1 = \text{1st intermediate frequency (fixed)=12 mc.}$$

$$f_2 = \text{2nd intermediate frequency (fixed)=455 kc.}$$

$$f_{02} = \text{2nd oscillator crystal frequency (fixed)=12,455 kc.}$$

$$f_1 = f_c - 5f_{01}$$

$$f_{01} = \frac{f_c - f_1}{5}$$

$$f_2 = f_{02} - f_1$$

b. Test Equipment

(1) Portable Equipment

A MOTOROLA P-8501-A Test Set, in conjunction with appropriate test crystals, will provide complete facilities for metering and/or aligning the receiver in the field. This instrument incorporates simplified meter switching, an expanded meter range, and a crystal controlled oscillator. The output frequency of the P-8501-A Test Set Oscillator is determined by the control crystal inserted into either of the two crystal sockets provided. The oscillator is expressly designed for use with specific types of "RESEARCH" Line Transmitter control crystals and a unique 455 kc. alignment crystal (available on separate order only).

When aligning a TA140B Series Receiver using a P-8501-A Test Set as a signal source, the following crystals should be used:

RF & 1st IF Alignment:

Use D03 or AN type transmitter control crystal of the same operating frequency as the receiver. (Available on separate order if not used with associated transmitter.)

2nd IF & Discriminator Alignment:

Use 455 Kc. Alignment Crystal. (Available for purchase by ordering MOTOROLA Type AQLS. Specify 455 Kc. when ordering.)

(2) Laboratory Equipment

The following test equipment or equivalents should be available for comprehensive bench alignment of the receiver.

(a) One (1) MOTOROLA Model P-8501-A Test Set with 455 Kc. Alignment Crystal (No. AQLS).

Any 0-50 microampere meter with an equivalent series resistance of 20,000 ohms may be used as a metering device. The meter should be connected from chassis ground to the pin receptacle of the metering socket corresponding to the stage being measured. Refer to the applicable schematic diagram for specific metering pin receptacle information.

NOTE

If desired, a Model 65B Measurements Corporation Signal Generator may be used in place of the P-8501-A Test Set as a signal source for 2nd IF alignment. (DO NOT use generator for discriminator alignment.) When this generator is used, an 18,000 ohm resistor should be connected in series with the generator output lead. A Model 65B Generator or equivalent is required for complete stage measurement of the receiver (see paragraph 7).

(b) One (1) Model 80 Measurements Corporation Signal Generator (2 mc. - 400 mc.) or equivalent, is used to produce the carrier frequency (144-174 mc.).

When applying a test signal to the grid of a tube, a coaxial lead with a resistive termination should be used. A Measurements Corporation coaxial carrier output cable, Part No. 80-ZH4 (50 ohms impedance with 50 ohms

termination) is most suitable for this purpose. When feeding a signal into an antenna circuit, use a coaxial lead with a 6 db. pad. A Measurements Corporation coaxial carrier output cable, Part No. 84-Z2-2 (50 ohms impedance) and an output matching pad, Part No. 80-ZH3 (6 db. loss) should be used for this application.

(c) One (1) power supply, preferably the unit which is normally used with the receiver being tested.

(d) One (1) Alignment Tool (MOTOROLA Part No. 66A835721).

c. MOTOROLA P-8501-A Test Set Switch Position and Corresponding Circuits

METERING SWITCH POSITION	CIRCUIT
1	2nd IF-3 Grid
2	1st Limiter Grid
3	No Connection
*+4, -4	Discriminator Output (Balance)
5	Discriminator Input
6	1st Oscillator Grid
7	No Connection
8	Audio Output Transformer

*The P-8501-A Test Set has +4 and -4 selector switch positions to permit an "up-scale" reading for discriminator balance adjustments.

d. Alignment Methods

IT IS RECOMMENDED THAT THE TEXT BE READ CAREFULLY BEFORE ATTEMPTING ANY ALIGNMENT ADJUSTMENTS.

Two alignment procedures are provided in this text.

The first is a comprehensive alignment for major bench testing, requiring the use of signal generator and/or a P-8501-A Test Set capable of producing an accurate 455 Kc. (2nd IF) signal and a second signal source capable of producing 12 mc. (1st IF), and 144-172 mc. (RF) signals.

The second is a simplified procedure in chart form using a MOTOROLA P-8501-A Test Set. This procedure permits receiver alignment in the field.

Following these two alignment procedures are general instructions for "reduction of ignition noise in mobile receivers" and a complete "stage measurements chart".

Alignment and gain measurements are made on FM receivers by observing, with a high resistance voltmeter or 1 megohm series compensated microammeter, (50-500 ua) the voltage of current developed at the grids of the various IF and limiter stages. Adjustment of the various tunable components is made to bring these readings to their optimum values. Stage gains can be measured by selecting a signal of an appropriate reference level, applying it to the stage under measurement, and comparing input to output level.

e. Two-Frequency Considerations

When aligning a two-frequency receiver for which channel separations are 240 kc. or less, it is recommended that the receiver be aligned to the lower frequency.

4. COMPREHENSIVE ALIGNMENT PROCEDURE

a. Preliminary

(1) Refer to page 5 for test equipment required.

(2) Connect the P-8501-A Test Set to the receiver METER receptacle.

b. Adjustment, Discriminator

It is imperative that the discriminator be adjusted to EXACTLY 455 Kc. A P-8501-A Test Set in conjunction with a MOTOROLA 455 Kc. Alignment Crystal, will prove most excellent for this purpose. If a 455 Kc. Alignment Crystal is not available, a reliable frequency meter (secondary standard, BC221 or equivalent) may be used for accurate discriminator alignment. Once adjusted, the discriminator setting should NOT be altered for the remainder of the alignment procedure.

(1) Using a Test Set

(a) Plug the 455 Kc. Alignment Crystal into the crystal socket of the Test Set.

(b) Set the GRID CURRENT-METER-FIELD STRENGTH switch in the GRID CURRENT position.

(c) Connect the RF Probe Cable to one end of the Extension Cable. Connect the opposite end of the Extension Cable to the RF OUTPUT receptacle on the Test Set.

(d) Place the Test Set ON-OFF switch in the ON position.

(e) Set the ATTENUATOR control for maximum output.

(f) Adjust the frequency ADJ. control for a maximum reading on the Test Set meter.

(g) Plug the Test Set metering cable into the METER receptacle on the receiver.

(h) Lay the RF Probe Cable under the receiver chassis near pin 1 of Tube V 106 (2nd IF-1).

(i) Place the REC - XMTR-0-50 ua switch on the Test Set in the REC position and the GRID CURRENT-METER-FIELD STRENGTH switch in the METER position.

(j) The discriminator primary coil has a locked adjustment and does not require tuning in a routine alignment. Should it become necessary to replace the Discriminator Transformer, the following procedure is recommended for adjustment of the primary coil.

1. Short the secondary coil of the Discriminator by soldering a very short bare wire jumper across terminals #4 and #5.

2. Adjust the primary (bottom slug) of the Discriminator for a maximum meter reading in position 5.

3. Carefully tighten the primary slug locknut without disturbing the primary adjustment.

4. Unsolder the shorting jumper.

IMPORTANT

It is imperative that the following discriminator secondary coil adjustment be made with extreme accuracy. Once adjusted, the discriminator setting should NOT be altered for the remainder of the alignment procedure.

(k) Adjust the secondary (top) of Discriminator Transformer T 1 for a zero (± 0.5 ua) reading with the Test Set meter switch in position +4 or -4.

(2) Using a Frequency Meter

(a) Set-up the frequency meter for an output of exactly 455 kc.

(b) Lay the frequency meter output lead near pin 1 of V 106.

(c) The Discriminator primary coil has a locked adjustment and does not require tuning in a routine alignment. Should it become necessary to replace the Discriminator Transformer, the following procedure is recommended for adjustment of the primary coil.

1. Short the secondary coil of the Discriminator by soldering a very short bare wire jumper across terminals #4 and #5.

2. Adjust the primary (bottom slug) of the Discriminator for a maximum meter reading with the Test Set selector switch in position 5.

3. Carefully tighten the primary slug lock nut without disturbing the primary adjustment.

4. Unsolder the shorting jumper.

(d) Adjust the secondary (top slug) of the Discriminator for a zero (± 0.5 ua) reading with the Test Set selector switch in position +4 or -4.

c. Adjustment, Second IF Coils

(1) Keep the Test Set RF Probe Cable near pin 1 of tube V 106. If a Model 65B or equivalent Signal Generator is to be used for 2nd IF alignment, connect its output cable to pin 1 of V 106.

(2) With the Test Set or Signal Generator set for maximum output, adjust frequency to exactly 455 Kc. (zero reading in position +4 or -4).

(3) Adjust Coil L 16 for a maximum reading in position 2.

NOTE

Undesirable stage saturation may result if the test signal is too strong. This condition may be recognized by a failure of the position 2 or 1 meter reading to change when the signal input to the receiver is reduced or increased. For proper alignment, keep the test signal

at such a level that a further increase of signal output will always produce a linear increase of meter reading. This procedure should be adhered to throughout the alignment of the 2nd IF, 1st IF, multiplier and RF Coils.

It is to be noted that when a Test Set is used for 2nd IF alignment, the ATTENUATOR Control may reduce signal output to such an extent that the test set oscillator may cease functioning. If saturation cannot be avoided without reducing Test Set output to the "no-oscillation" level, reduce the signal input to the receiver by increasing the distance between the RF Probe Cable and pin 1 V 106.

(4) Adjust Coil L 15 for a maximum reading in position 1 or 2.

(5) Adjust Coil L 14 for a maximum reading in position 1 or 2.

d. Adjustment, First IF Coils

(1) Connect the Model 80 or equivalent Signal Generator to the grid (pin 7) of V 105.

(2) Set the generator to 12 mc. as indicated on the generator scale. Set generator for maximum output.

(3) Readjust generator for exactly 12 mc. output by resetting the frequency control for zero (± 0.5 ua) reading in position +4 or -4.

(4) Connect the generator to the grid (pin 1) of 1st IF Amp. V 104.

(5) Adjust IF Coils L 13, L 12 and L 11 for a maximum reading in position 1 or 2.

(6) Connect the generator to the grid (pin 6) of 1st Mixer V 103.

(7) Adjust IF Coils L 10, L 9 and L 8 for a maximum reading in position 1 or 2.

e. First Oscillator Alignment

(1) Position the oscillator trimmer C 110 so that the slot is parallel with the length of the receiver chassis.

(2) Place the test set metering switch in position 6 (if the receiver is for two-frequency

operation place the frequency selector switch in the **FREQ. 1** position) adjust oscillator Coil L 5 for peak reading on test set meter.

When aligning a two-frequency receiver be sure that the frequency selector switch is in the position corresponding to the oscillator circuit being aligned. To align the #2 frequency oscillator repeat the preceding step adjusting oscillator Coil L 201 and oscillator trimmer C 204.

f. Frequency Check

(1) Allow a five minute receiver warm-up period. Place the test set metering switch in position +4 or -4. Transmit the receiver carrier frequency from the transmitter which the receiver is normally intended to receive. A zero meter reading indicates the receiver is "on frequency", adjust the oscillator trimmer C 110 to obtain this reading.

(2) Future minor adjustments may be made by tuning the oscillator coil only. However, if position 4 is more than ± 1 ua, it will be necessary to readjust the oscillator trimmer.

g. Adjustment, Multiplier and RF Coils

NOTE

RF circuits of two-frequency receivers should be peaked on the lower of the two frequencies.

(1) Set the signal generator to the operating frequency of the receiver as indicated on the generator scale. Set generator for maximum output.

(2) Readjust the generator for exact frequency by resetting the frequency control for zero (± 0.5 ua) reading in position +4 or -4.

(3) Adjust Multiplier Coils L 6 (L 203 on 2-freq. models) and L 7 for a maximum reading in position 1 or 2.

(4) Using the coaxial lead and 6 db. pad, connect the generator to the ANTenna receptacle of the receiver.

(5) Using minimum amount of output from the signal generator, adjust RF Coils L 4, L 3, L 2 and L 1 for a maximum meter reading in position 1 or 2.

(6) This completes the alignment procedure. Disconnect the test equipment from the receiver.

5. MISCELLANEOUS ADJUSTMENTS

a. Audio Level Adjustment

The "audio level control" located on the receiver chassis permits adjustment to obtain input level to the audio stages to compensate for variations in characteristics of tubes as well as base station transmitter deviation. As this control has more than an adequate range of audio drive, it should be adjusted for maximum desired speaker level with the VOLUME control on the control head or control panel set at maximum (extreme clockwise rotation). Turn the VOLUME control on the control head or control panel to its extreme clockwise rotation. With the base station transmitter transmitting a full normal deviation signal, adjust the "audio level control" on the receiver chassis to a setting just below the point where distortion becomes audible. This setting will provide a minimum of 1.5 watts audio output. Depending upon the characteristics of the output tube, the receiver may have 2 or more watts audio output.

b. Adjustment for Reduction of Ignition Noise

Ignition noise balance adjustments should be made with the receiver installed in the mobile vehicle and the vehicle engine running.

(1) Turn the equipment "ON" and allow it to warm-up for at least five minutes.

(2) Plug the P-8501-A Test Set into the METER receptacle on the receiver.

(3) Radiate a signal of the frequency of the receiver by means of a P-8501-A Test Set with D34 or AN crystal; a Model 80 or equivalent Signal Generator; or a distant transmitter. The signal should be just strong enough to produce receiver quieting (20 to 30 db.).

(4) Turn up receiver VOLUME to a normal useable level.

(5) With the vehicle engine running and the Test Set selector switch in position 2, note the meter reading.

(6) Make a slight adjustment of 2nd IF Coils L 15 and L 14 for minimum audible ignition noise. This should be only a slight adjustment and should not decrease position 2 reading more than one-half microampere.

(7) If adjustment of the 2nd IF Coils does not prove effective, adjust any ONE of the 1st IF Coils L 11 to L 13 until ignition noise is substantially reduced.

CAUTION

The 1st IF Coils are very sensitive and may only be adjusted a very slight amount without reducing receiver gain. When making ignition noise balance adjustments, be careful NOT to decrease position 2 reading more than one-half microampere.

(8) If satisfactory reduction of audible ignition noise cannot be obtained by the methods described in steps (6) and (7), the secondary winding (top) of Discriminator Transformer T 1 is probably not aligned to exactly 455 Kc. Check alignment of the discriminator with a reliable frequency source (such as a P-8501-A Test Set with 455 Kc. Alignment Crystal) and readjust as described in the previous alignment procedures.

c. Modifications for Low-Tone QUIK-CALL Applications

Certain modifications must be made if any of these receivers are used in communication systems which incorporate MOTOROLA QUIK-CALL tones (100-312 cps). For details of these modifications contact MOTOROLA Inc., C. & E. Division, Marketing Department, 4501 W. Augusta Blvd., Chicago 51, Illinois.

6. STAGE MEASUREMENTS

APPROX. MICROVOLT INPUT	INPUT TO	FREQ. IN MC.	METER POSITION	METER READING OR DB.
Noise	Antenna	-	1	-0.1 to -1
Noise	Antenna	-	2	-18 to -40
Noise	Antenna	-	4	**0
Noise	Antenna	-	5	-12 to -16
Noise	Antenna	-	6	-12 to -40
0.5 or less	Antenna	F_c	*DB Meter	20 db. (quieting)
6.0	Antenna	F_c	1	-2
2.5 14.0	Pin 2 of V 101 1st RF	F_c F_c	*DB Meter 1	20 db. (quieting) -2
3.8 30.0	Pin 1 of V 103 1st Mixer	12.0 12.0	*DB Meter 1	20 db. (quieting) -2
5.0 150	Pin 1 of V 104 1st IF	12.0 12.0	*DB Meter 1	20 db. (quieting) -2
5000	Filter	.455	1	-5
2000	Pin 1 of V 106 2nd IF-1	.455	1	-5
150,000	Pin 1 of V 107 2nd IF-2	.455	1	-5

NOTE

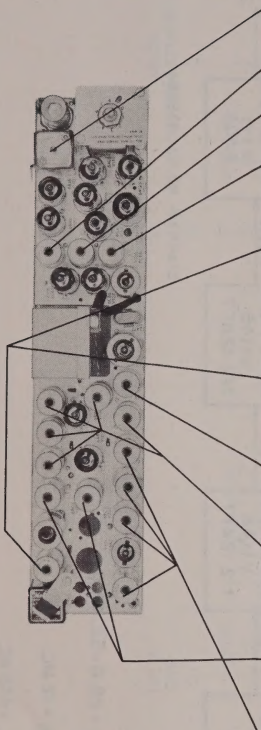
A Model 80 Signal Generator with output cable (Measurements Corporation Part No. 80-XH4) was used when taking readings on V 101, V 103, and V 104. A Model 65B Signal Generator with a 30 ohm terminated output cable was used when taking all other readings.

* Refer to Laboratory Sensitivity Check on page 4 when making this measurement.

** A meter reading of up to ± 1 ua. of zero is allowable without any degradation.

7. SIMPLIFIED ALIGNMENT PROCEDURE

After the serviceman becomes familiar with the alignment of this unit he may use this simplified procedure as an alignment. He should not attempt to use the chart until he has followed the comprehensive alignment procedure described in this section.



SEQUENCE	METER SWITCH POSITION	STAGE AND TEST CONDITION	ALIGN. FREQ.	ADJUSTMENT	METER READING
Step 1	-4 or +4	DISCRIMINATOR SECONDARY COIL: See NOTE 2; place RF probe near pin 1 of V 106, (RF probe to remain in this position for step 1 thru 4).	455 Kc. sharp tuning	T 1 (top slug)	Zero
Step 2	2	2nd IF-3 COIL: Reduce generator output for reading of less than saturation.	455 Kc. sharp tuning	L 16	Maximum
Step 3	1	2nd IF-2 COIL	455 Kc. broad tuning	L 15	Maximum
Step 4	1	2nd IF-1 COIL	455 Kc. sharp tuning	L 14	Maximum
Step 5	6	1st OSCILLATOR COIL: Disconnect generator before adjustment. On 2-Freq. Models, make adjustments in F 1 and F 2 positions of the selector switch respectively. <u>NOTE</u> The coil on top of the chassis is for the fine tuning adjustments. The coil on the wiring side of the chassis is for the coarse tuning adjustments, which normally does not require any adjustments.	Rcvr. crystal freq. sharp tuning	L 5 and L 201 (2-Freq. Only)	Maximum
Step 6	4	1st OSCILLATOR COIL: Readjust coil(s) with carrier signal being received from external transmitter. After adjustment, check meter switch position 6 for 12 ua. reading or more with no signal received. If less than 12 ua.; check oscillator tube and associated components.	Rcvr. crystal freq. sharp tuning	L 5 and L 201 (2-Freq. Only)	Zero
Step 7	2	1st IF COIL: Note that two peaks are present within the coil tuning range. The peak found when the slug is nearest the top of the coil is the proper alignment peak.	12 Mc. sharp tuning	L 13	Maximum
Step 8	2	1st IF AND MIXER COILS: Transmitter crystal in generator socket (refer to NOTE 1; substituting transmitter crystal for 455 Kc. Crystal); RF probe connected to ANT. connector. Generator tuned for proper RF frequency and output adjusted for a reading less than saturation.	12 Mc. sharp tuning	L 12, L 11, L 10, L 9, and L 8	Maximum
Step 9	2	OSCILLATOR MULTIPLIER COILS: Generator output and connections same as for step 8.	3 times crystal freq. (generator at carrier freq.) sharp tuning	L 7 and L 6	Maximum
Step 10	2	RF COILS: Generator output and connections same as for step 8.	carrier freq. sharp tuning	L 4, L 3, L 2 and L 1	Maximum

NOTE 1:

Preliminary Adjustments For Operating Test Set as Signal Generator

- (1) Plug the 455 Kc. Alignment Crystal into the crystal socket of the Test Set.
- (2) Set the GRID CURRENT-METER-FIELD STRENGTH switch in the GRID CURRENT position.
- (3) Connect the RF Probe Cable to one end of the Extension Cable. Connect the opposite end of the Extension Cable to the RF OUTPUT receptacle on the Test Set.
- (4) Place the Test Set ON-OFF switch in the ON position.
- (5) Set the ATTENUATOR control for maximum output.
- (6) Adjust the frequency ADJ. control for a maximum reading on the Test Set Meter.

NOTE 2:

- (1) Place the GRID CURRENT-METER-FIELD STRENGTH switch to the METER position and place the selector switch to position +4 or -4.
- (2) Adjust the Test Set oscillator frequency for a zero (±0.5 ua.) reading by means of the ADJ. control.
- (3) Place the meter switch in position 2 and peak the test set OSC. TUNE control for maximum reading.
- (4) Readjust the Test Set ADJ. control for zero (±0.5 ua.) reading in position +4 or -4.

144-174 MC. SENSICON "G" RECEIVER
BLOCK DIAGRAM

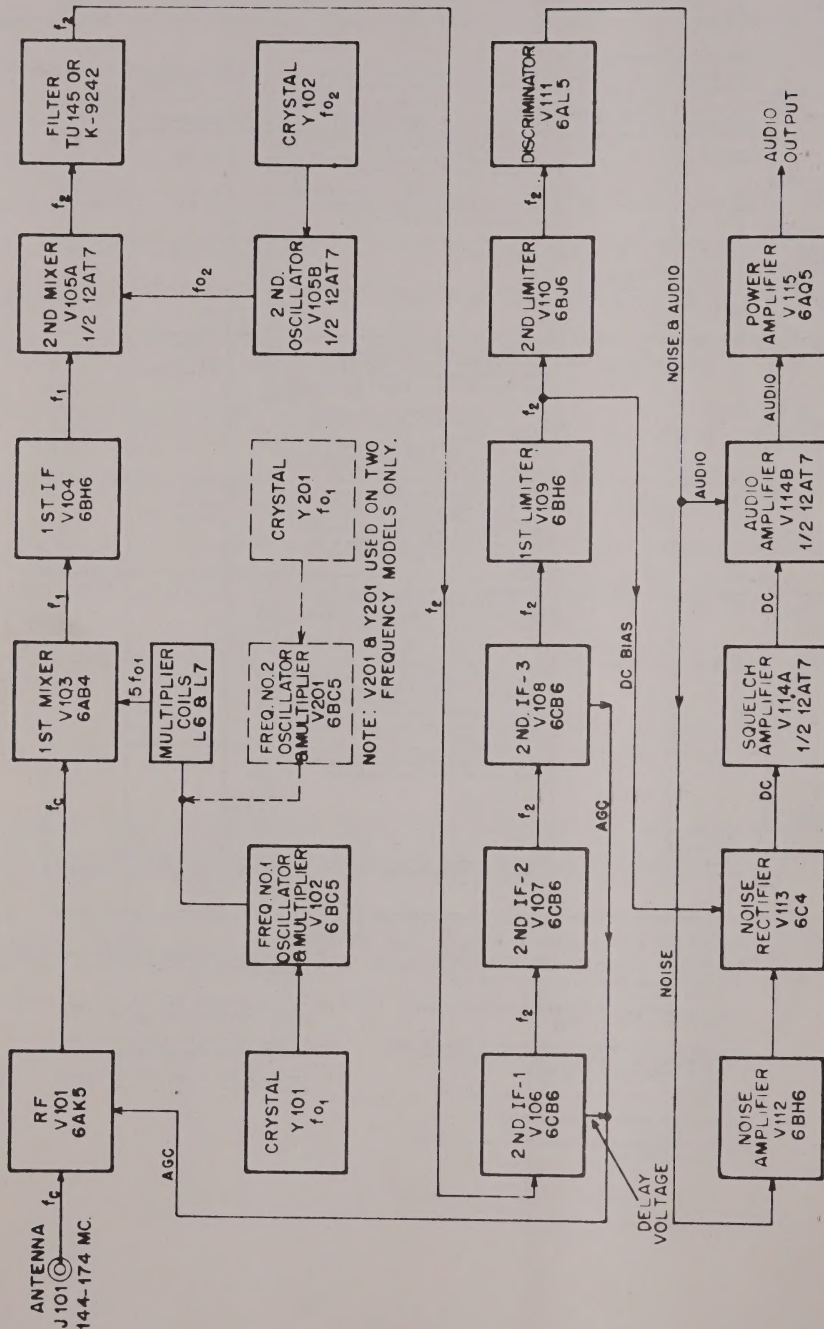


DIAGRAM NO. 63C839284

LEGEND:

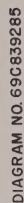
f_c = CARRIER FREQUENCY = 144 - 174 MC.

f_{o1} = 1ST. OSCILLATOR FREQUENCY = $\frac{f_c - f_1}{5} = 28.0 - 32.4$ MC.

f_1 = 1ST INTERMEDIATE FREQUENCY = $f_c - 5f_{o1} = 12$ MC.

f_2 = 2ND INTERMEDIATE FREQUENCY = $f_{o2} - f_1 = 455$ KC.

f_{o2} = 2ND. OSCILLATOR FREQUENCY = 12.455 MC.



NOTES:

1. Y201, L201 & V201 ARE USED ON 2 FREQUENCY MODELS ONLY.
2. TK228 RECEIVER CONVERSION KIT USED ON TA163-A SERIES MODELS ONLY.

144-174 MC. SINGLE-FREQUENCY SENSICON "G" RECEIVER SCHEMATIC DIAGRAM

10%, 1/2 WATT

MICROFARADS

ALWAYS 6VDC.
ATING FROM A
OPERATING

OV) AND WITH
(LOCKWISE)
(WISE).

VARIOUS RECEIVER
LE.
IDENTIFICATION.

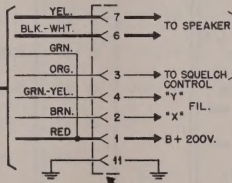
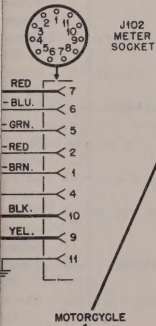
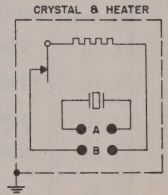
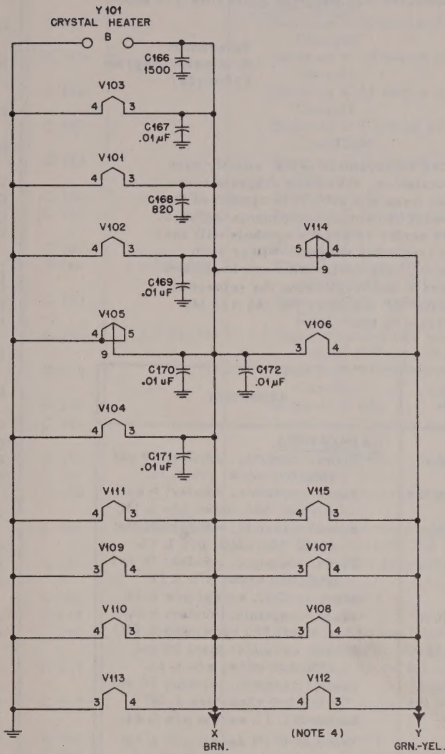
W	TA163-A X
I	K-9242
	18K
	680
	560K
	56K
	56K

RE USED:

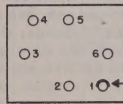
POWER SUPPLY TERMINAL
THE DC VOLUME CONTROL.
LS 1 & 2 ON POWER SUPPLY

POWER SUPPLY TERMINAL

ERTED BETWEEN TERMINALS
ND THE SPEAKER.



T1
TERMINAL IDENTIFICATION



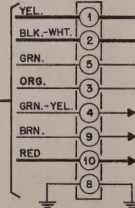
BOTTOM VIEW
OF COILS



MODEL CHART

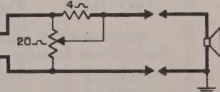
MODEL	CHANNEL SPACING	APPLICATION
TA40-BW	50KC	MOBILE & SERVI-CAR
TA40-BX	120KC	MOBILE & SERVI-CAR
TA40-BS	30KC	MOBILE & SERVI-CAR
TA163-AW	60KC	SOLO-CYCLE
TA163-AX	120KC	SOLO-CYCLE

POWER SUPPLY
TERMINAL BOARD

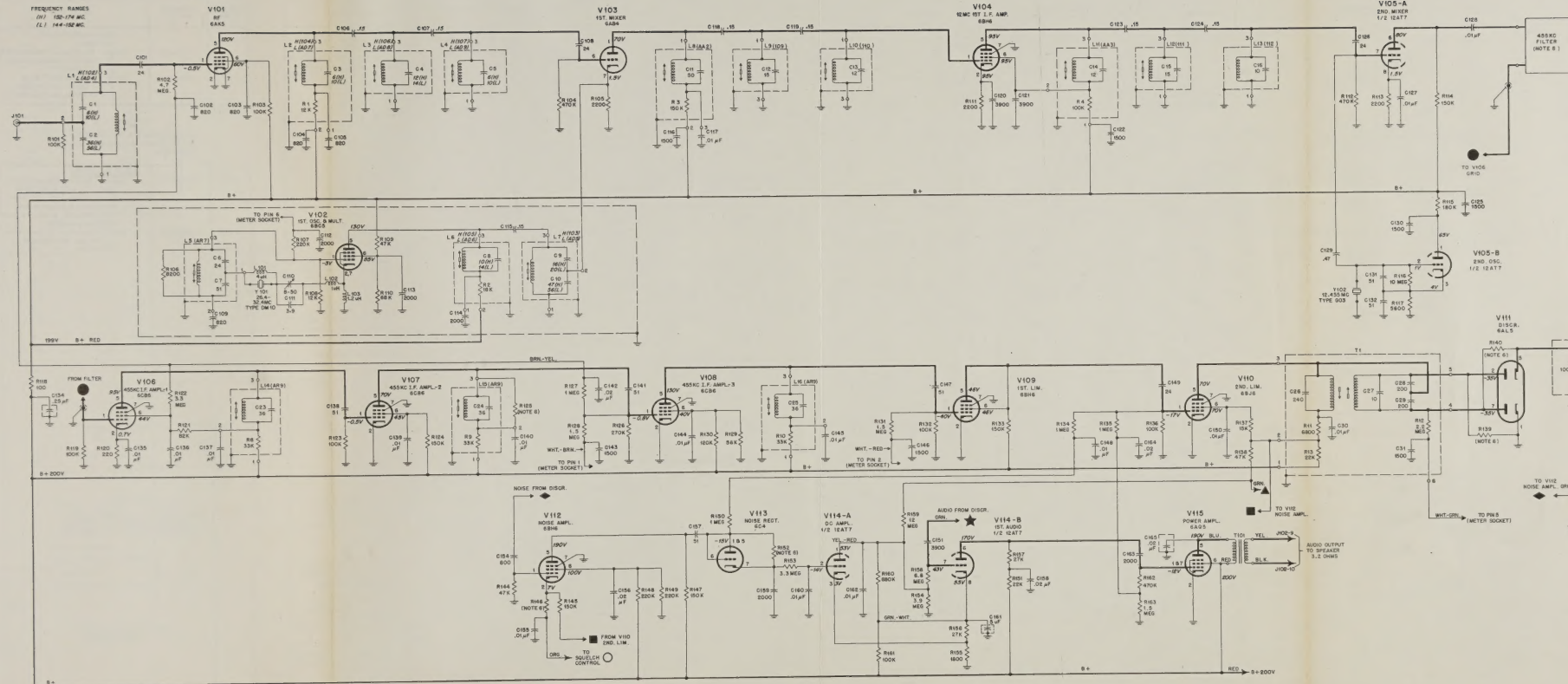


SEE NOTE 7

SPEAKER PAD CONTROL



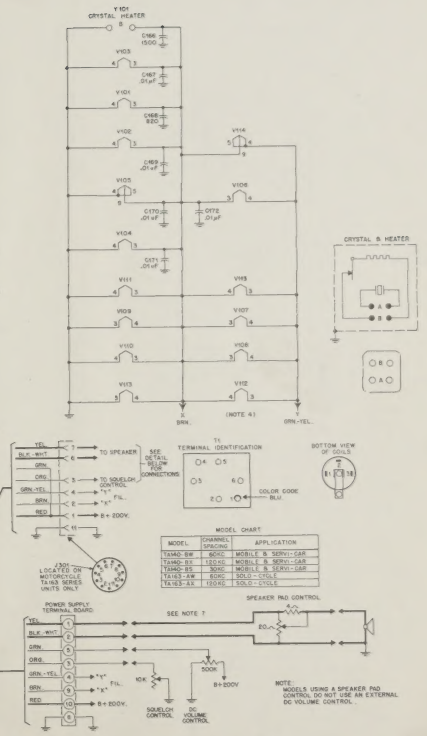
NOTE:
MODELS USING A SPEAKER PAD
CONTROL DO NOT USE AN EXTERNAL
DC VOLUME CONTROL.



- NOTES:**
- REFER TO PARTS LIST.
 - ALL RESISTOR VALUES ARE INDICATED IN OHMS $\pm 10\%$, 1/2 WATT UNLESS OTHERWISE STATED. R = 1000 OHMS.
 - ALL CAPACITOR VALUES ARE INDICATED IN MICROMICROFARADS UNLESS OTHERWISE STATED.
 - HEATER INPUT VOLTAGE FOR "X" FILAMENTS IS ALWAYS 8V0C. "Y" INPUT VOLTAGE IS 250V (0.5V) WHEN OPERATING FROM A 6V0C PRIMARY POWER SOURCE OR 12V0C WHEN OPERATING FROM A 12V0C PRIMARY POWER SOURCE.
 - ALL VOLTAGES MEASURED WITH A VTVM (8+200V) AND WITH THE SWITCH ON CONTROL. AT MINIMUM (COUNTERCLOCKWISE) AND DC VOLUME CONTROL. AT MAXIMUM (CLOCKWISE).
 - COMPONENTS NOTED DIFFER IN VALUE FOR THE VARIOUS RECEIVER MODELS FOR WHICH THIS DIAGRAM IS APPLICABLE. REFER TO THE FOLLOWING TABLE FOR SPECIFIC IDENTIFICATION.

COMPONENT	144-174 MC. (H)	144-152 MC. (L)	144-174 MC. (H)	144-152 MC. (L)	144-174 MC. (H)	144-152 MC. (L)
1. FILTER	100	100	100	100	100	100
2. RES.	100K	100K	100K	100K	100K	100K
3. CAP.	100	100	100	100	100	100
4. RES.	100K	100K	100K	100K	100K	100K
5. CAP.	100	100	100	100	100	100
6. RES.	100K	100K	100K	100K	100K	100K
7. CAP.	100	100	100	100	100	100
8. RES.	100K	100K	100K	100K	100K	100K
9. CAP.	100	100	100	100	100	100
10. RES.	100K	100K	100K	100K	100K	100K
11. CAP.	100	100	100	100	100	100
12. RES.	100K	100K	100K	100K	100K	100K
13. CAP.	100	100	100	100	100	100
14. RES.	100K	100K	100K	100K	100K	100K
15. CAP.	100	100	100	100	100	100
16. RES.	100K	100K	100K	100K	100K	100K
17. CAP.	100	100	100	100	100	100
18. RES.	100K	100K	100K	100K	100K	100K
19. CAP.	100	100	100	100	100	100
20. RES.	100K	100K	100K	100K	100K	100K
21. CAP.	100	100	100	100	100	100
22. RES.	100K	100K	100K	100K	100K	100K
23. CAP.	100	100	100	100	100	100
24. RES.	100K	100K	100K	100K	100K	100K
25. CAP.	100	100	100	100	100	100
26. RES.	100K	100K	100K	100K	100K	100K
27. CAP.	100	100	100	100	100	100
28. RES.	100K	100K	100K	100K	100K	100K
29. CAP.	100	100	100	100	100	100
30. RES.	100K	100K	100K	100K	100K	100K
31. CAP.	100	100	100	100	100	100
32. RES.	100K	100K	100K	100K	100K	100K
33. CAP.	100	100	100	100	100	100
34. RES.	100K	100K	100K	100K	100K	100K
35. CAP.	100	100	100	100	100	100
36. RES.	100K	100K	100K	100K	100K	100K
37. CAP.	100	100	100	100	100	100
38. RES.	100K	100K	100K	100K	100K	100K
39. CAP.	100	100	100	100	100	100
40. RES.	100K	100K	100K	100K	100K	100K
41. CAP.	100	100	100	100	100	100
42. RES.	100K	100K	100K	100K	100K	100K
43. CAP.	100	100	100	100	100	100
44. RES.	100K	100K	100K	100K	100K	100K
45. CAP.	100	100	100	100	100	100
46. RES.	100K	100K	100K	100K	100K	100K
47. CAP.	100	100	100	100	100	100
48. RES.	100K	100K	100K	100K	100K	100K
49. CAP.	100	100	100	100	100	100
50. RES.	100K	100K	100K	100K	100K	100K

- 7. TWO DIFFERENT METHODS OF VOLUME CONTROL ARE USED:**
- GREEN LEAD CONNECTED TO TERMINAL 5 ON POWER SUPPLY TERMINAL BOARD IS CONNECTED TO THE MOVING ARM OF THE DC VOLUME CONTROL.
 - SPEAKER IS CONNECTED DIRECTLY TO TERMINALS 1 & 2 ON POWER SUPPLY TERMINAL BOARD.
- 8. P.A.D. CONTROL:**
- GREEN LEAD CONNECTED TO TERMINAL 5 ON POWER SUPPLY TERMINAL BOARD IS CONNECTED DIRECTLY TO B+.
 - POTENTIOMETER AND A 40K RESISTOR IS INSERTED BETWEEN TERMINALS 1 & 2 ON POWER SUPPLY TERMINAL BOARD AND THE SPEAKER.



REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
	1U812608	(Narrowed Channel) p/o TA140BS K-9241 Uni-Channel PERMAKAY IF Filter (Adjacent Channel) p/o TA163AW
	1U820043	K-9242 Uni-Channel TRI-K Filter (Alternate Channel) p/o TA140BX and TA163AX

CRYSTALS

NOTE

Crystal Units are not part of the
Receiver Units and must be ordered
separately.

Y 101	1U835628	CRYSTAL UNITS, Quartz: Receiver Control Oscil- lator; 26.4-32.4 mc; with 6 volt heater unit; MOTOROLA TYPE DM10 when ordering frequency must must be specified.
Y 102	1U830014	Quartz: Receiver IF Oscillator; 12.455 mc; MOTOROLA TYPE G03

PERMAKAY
(Channel)

ter

144-174 MC. TWO-FREQUENCY SENSICON "G" RECEIVER SCHEMATIC DIAGRAM

$\pm 10\%$, 1/2 WATT

PICOMICROFARADS

IS ALWAYS 6VDC.
OPERATING FROM A
HEN OPERATING

* 200V) AND WITH
(CLOCKWISE)
CLOCKWISE).

THE VARIOUS RECEIVER
CABLE
FIG IDENTIFICATION.

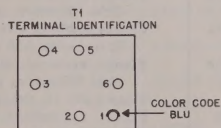
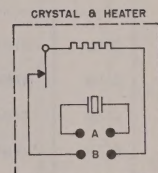
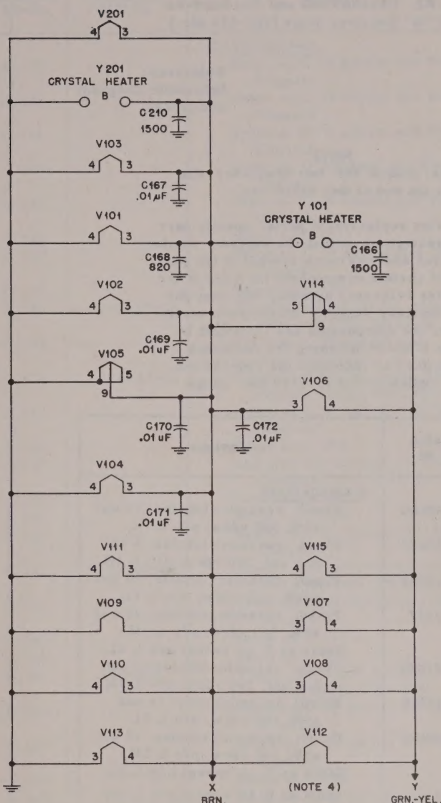
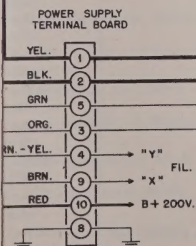
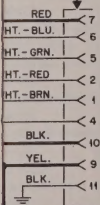
DL ARE USED:

ON POWER SUPPLY TERMINAL
OF THE DC VOLUME CONTROL.
TERMINALS 1 & 2 ON POWER

ON POWER SUPPLY TERMINAL
INSERTED BETWEEN TERMINALS
AND THE SPEAKER.



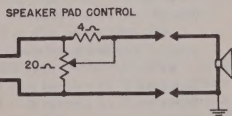
J102
METER
SOCKET



BOTTOM VIEW
OF COILS



MODEL CHART		
MODEL	CHANNEL SPACING	APPLICATION
TA140-BW-R2	60KC	MOBILE & SERVI-CAR
TA140-BX-R2	120KC	MOBILE & SERVI-CAR
TA140-BY-R2	30KC	MOBILE & SERVI-CAR



NOTE:
MODELS USING A SPEAKER PAD
CONTROL, DO NOT USE AN EXTERNAL
DC VOLUME CONTROL.

SCHEMATIC DIAGRAM PARTS LIST

Model: TA140BW, TA140BX, TA140BS, TA163AW and
TA163AX SENSICON "G" Receiver Unit (44-174 MC)Reference:
Schematic Diagram
63E93287

NOTE

When ordering replacement parts, specify part number, description, schematic diagram number, diagram issue and reference symbol of the part. The value of certain components included in the 1 to 99 series referenced phenolic will vary for different frequency ranges. Where such variations occur, the components are identified by the suffixes L and H following the reference symbol. Suffix "L" indicates the 144-152 MC range; "H" 152-174 MC.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITORS.
C 10	21A801139	Fixed; ceramic; disc; .01 uf ±80-20%; 500 vdcw; p/o T 1
C 31	21B800801	Fixed; ceramic; disc; 1500 uf GMV ±100% max.; 300 vdcw; p/o T 1
C 101	21K840365	Fixed; ceramic; disc; 24 uf ±5%, 500 vdcw
C 102	21B837745	Fixed; ceramic; disc; 820 uf ±10%, 500 vdcw
C 103		Same as C 102
C 104		Same as C 102
C 105		Same as C 102
C 106	21K881064	Fixed; molded phenolic; tubular; .35 uf ±5%, 500 vdcw
C 107		Same as C 106
C 108		Same as C 101
C 109		Same as C 102
C 110	20B840719	Variable; air; 8 uf min. to 50 uf max.
C 111	21K838284	Fixed; ceramic; disc; 3.9 uf ±1%, 500 vdcw
C 112	21K837746	Fixed; ceramic; disc; 2000 uf ±1%, 500 vdcw
C 113		Same as C 112
C 114		Same as C 112
C 115		Same as C 106
C 116		Same as C 31 except p/o Basic Chassis
C 117		Same as C 10 except p/o Basic Chassis
C 118		Same as C 106
C 119		Same as C 106
C 120	21K837996	Fixed; ceramic; disc; 3900 uf ±10%, 500 vdcw
C 121		Same as C 120
C 122		Same as C 31 except p/o Basic Chassis
C 123		Same as C 106
C 124		Same as C 106
C 125		Same as C 31 except p/o Basic Chassis
C 126		Same as C 101
C 127		Same as C 10 except p/o Basic Chassis
C 128		Same as C 10 except p/o Basic Chassis
C 129	21K83994	Fixed; molded phenolic; tubular; .47 uf ±20%; 500 vdcw
C 130		Same as C 31 except p/o Basic Chassis
C 131		Same as C 7 except p/o Basic Chassis
C 132		Same as C 7 except p/o Basic Chassis
C 133		NOT USED
C 134	8A892986	Fixed; oil filled; tubular; .25 uf ±20%, 400 vdcw
C 135		Same as C 30 except p/o Basic Chassis
C 136		Same as C 30 except p/o Basic Chassis
C 137		Same as C 30 except p/o Basic Chassis
C 138		Same as C 13 except p/o Basic Chassis
C 139		Same as C 30 except p/o Basic Chassis
C 140		Same as C 30 except p/o Basic Chassis
C 141		Fixed; molded silver mica; 240 uf ±5%; 500 vdcw; p/o T 1
C 142	21K840811	Fixed; ceramic; disc; 10 uf ±5%, 500 vdcw; p/o T 1
C 143	21K840812	Fixed; molded silver mica; 200 uf ±5%; 500 vdcw; p/o T 1
C 29		Same as C 28 except p/o T 1

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITORS.
C 144		Fixed; ceramic; disc; .01 uf ±80-20%; 500 vdcw; p/o Basic Chassis
C 145		Same as C 30 except p/o Basic Chassis
C 146		Same as C 31 except p/o Basic Chassis
C 147		Same as C 7 except p/o Basic Chassis
C 148		Same as C 30 except p/o Basic Chassis
C 149		Same as C 101
C 150		Same as C 30 except p/o Basic Chassis
C 151		Same as C 120
C 152	21K847601	Fixed; molded silver mica; 2000 uf ±5%; 500 vdcw
C 153		Same as C 31 except p/o Basic Chassis
C 154	21K840049	Fixed; molded sil. mica phenolic coated; 800 uf ±5%; 300 vdcw
C 155		Same as C 10 except p/o Basic Chassis
C 156		Same as C 142
C 157		Same as C 7 except p/o Basic Chassis
C 158		Same as C 142
C 159		Same as C 112
C 160		Same as C 30 except p/o Basic Chassis
C 161	21K890624	Fixed; electrolytic; tubular; 5 uf ±100-15%; 450 vdcw
C 162		Same as C 30 except p/o Basic Chassis
C 163		Same as C 112
C 164		Same as C 142
C 165	8K85984	Fixed; oil filled; tubular; .02 uf ±20%; 400 vdcw
C 166		Same as C 31 except p/o Basic Chassis
C 167		Same as C 30 except p/o Basic Chassis
C 168		Same as C 102
C 169		Same as C 30 except p/o Basic Chassis
C 170		Same as C 30 except p/o Basic Chassis
C 171		Same as C 30 except p/o Basic Chassis
C 172		Same as C 30 except p/o Basic Chassis
		CAPACITOR-RESISTOR ASSEMBLY.
E 101	21K842354	Tubular; consisting of: Dual CAPACITOR; printed circuit; silver paint on ceramic form; each section 100 uf, 300 vdcw
		One RESISTOR; fixed; carbon 47K ±20%
		CONNECTORS.
J 101	9A87120	Receptacle; female; single contact; round molded mica filled phenolic base; for 1/8" diameter male pin connector
J 102	9B86864	Receptacle; female; 11 contact; polarized; round molded black plastic base; chassis mounted; does not include A2A821428 RING, connector retainer; which must be ordered separately
J 301	28A822176	Receptacle; male; 11 contact; polarized; round; black phenolic base; saddle

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CONNECTORS.
		mounting; used only in TA163 Series Models
		COILS.
L 1 L	24K836515	RF; Antenna; base stamped AD; includes 76A824120 CORE, adjustable tuning
L 1 H	24B242102	RF; Antenna; base stamped 102; includes 76A824120 CORE, adjustable tuning
L 2 L	24K836518	RF; Plate; base stamped ADT; includes 76A824120 CORE, adjustable tuning
L 2 H	24B242104	RF; Plate; base stamped 104; includes 76A824120 CORE, adjustable tuning
L 3 L	24K836519	RF; Coupling; base stamped AD; includes 76A824120 CORE, adjustable tuning
L 3 H	24B242106	RF; Coupling; base stamped 106; includes 76A824120 CORE, adjustable tuning
L 4 L	24K836520	RF; Mixer Grid; base stamped ADT; includes 76A824120 CORE, adjustable tuning
L 4 H	24K836521	RF; Mixer Grid; base stamped 107; includes 76A824120 CORE, adjustable tuning
L 5	24B40709	RF; 1st Oscillator; base stamped AR7; includes 46K881276 CORE, adjustable tuning; coded ORANGE dot
L 6 L	24K836517	RF; 1st Multiplier; base stamped AD6; includes 76A824120 CORE, adjustable tuning
L 6 H	24K824105	RF; 1st Multiplier; base stamped 105; includes 76A824120 CORE, adjustable tuning
L 7 L	24K836516	RF; Injection; base stamped AD5; includes 76A824120 CORE, adjustable tuning
L 7 H	24K824103	RF; Injection; base stamped 103; includes 76A824120 CORE, adjustable tuning
L 8	24K834778	IF; 5 mc IF - 1; base stamped AA2; includes 76A824118 CORE, adjustable tuning
L 9	24B824109	IF; 5.5 mc IF-2 base stamped 109; includes 76A824118 CORE, adjustable tuning
L 10	24B824110	IF; 5.5 mc IF - 3; base stamped 110; includes 76A824118 CORE, adjustable tuning
L 11	24K834779	IF; 5.5 mc IF - 4; base stamped AA3; includes 76A824118 CORE, adjustable tuning
L 12	24K824111	IF; 5.5 mc IF - 5; base stamped 111; includes 76A824118 CORE, adjustable tuning
L 13	24B824112	IF; 5.5 mc IF - 6; base stamped 112; includes 76A824118 CORE, adjustable tuning
L 14	24K840842	2nd IF - 1; base stamped AR9; includes 46K891110 CORE, adjustable tuning; coded GREEN dot
L 15		Same as L 14 except 2nd IF - 2
L 101	24A840728	RF; choke; 1 microhenries; 1/2 w; ins.; TA140BS only

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
L 102	24B840042	coded WHT-BLU dot
L 103	24K840559	RF; choke; 1 microhenries; coded RED-BLK dot
		COILS.
R 1	6R6394	Fixed; carbon; 12K ±10%; 1/2 w; ins.; p/o L 2
R 2	6R5591	Fixed; carbon; 18K ±10%; 1/2 w; ins.; p/o L 2
R 3	6R398	Fixed; carbon; 150K ±5%; 1/2 w; ins.; p/o L 1
R 4	6R4031	Fixed; carbon; 150K ±5%; 1/2 w; ins.; p/o L 1
R 5		NOT USED
R 6		NOT USED
R 7		NOT USED
R 8	6R6410	Fixed; carbon; 33K ±10%; 1/2 w; ins.; p/o L 14
R 9		Same as R 8 except p/o L 15
R 10	6R4428	Fixed; carbon; 6.8K ±10%; 1/2 w; ins.; p/o T 1
R 11	6R4433	Fixed; carbon; 2.2 megohm ±10%; 1/2 w; ins.; p/o T 1
R 12	6R397	Fixed; carbon; 22K ±10%; 1/2 w; ins.; p/o T 1
R 101	6R5553	Fixed; carbon; 100K ±5%; 1/2 w; ins.
R 102	6R6446	Fixed; carbon; 4.7 megohm ±10%; 1/2 w; ins.
R 103		Same as R 101
R 104	6R6377	Fixed; carbon; 470K ±10%; 1/2 w; ins.
R 105	6R6069	Fixed; carbon; 2.2K ±10%; 1/2 w; ins.
R 106	6R400490	Fixed; carbon; 8.2K ±5%; 1/2 w; ins.; TA140BW, TA163AW and TA163AX only
R 107	6R40066	Fixed; carbon; 220K ±5%; 1/2 w; ins.
R 108	6R2075	Fixed; carbon; 12K ±5%; 1/2 w; ins.
R 109	6R6048	Fixed; carbon; 47K ±10%; 1/2 w; ins.
R 110	6R6479	Fixed; carbon; 68K ±5%; 1/2 w; ins.
R 111		Same as R 105
R 112		Same as R 104
R 113		Same as R 105
R 114		Same as R 3 except p/o Basic Chassis
R 115	6R6444	Fixed; carbon; 180K ±10%; 1/2 w; ins.
R 116	6R5622	Fixed; carbon; 10 megohm ±10%; 1/2 w; ins.
R 117	6R6317	Fixed; carbon; 5.6K ±10%; 1/2 w; ins.
R 118	6R6326	Fixed; carbon; 100 ohm ±10%; 1/2 w; ins.
R 119		Same as R 101
R 120	6R6270	Fixed; carbon; 220 ohm ±10%; 1/2 w; ins.
R 121	6R5644	Fixed; carbon; 82K ±10%; 1/2 w; ins.
R 122	6R6497	Fixed; carbon; 3.3 megohm ±10%; 1/2 w; ins.
R 123		Same as R 101
R 124		Same as R 3 except p/o Basic Chassis
R 125	6R488095	Fixed; carbon; 18K ±5%; 1/2 w; ins.
R 125S	6R5553	Fixed; carbon; 100K ±5%; 1/2 w; ins.; TA140BS only

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
R 126	6R6414	Fixed; carbon; 270K ±10%; 1/2 w; ins.
R 127	6R6046	Fixed; carbon; 1 megohm ±10%; 1/2 w; ins.
R 128	6R400228	Fixed; carbon; 1.5 megohm ±5%; 1/2 w; ins.
R 129	6R6378	Fixed; carbon; 56K ±10%; 1/2 w; ins.
R 130	6R5631	Fixed; carbon; 120K ±10%; 1/2 w; ins.
R 131		Same as R 128
R 132		Same as R 101
R 133		Same as R 3 except p/o Basic Chassis
R 134		Same as R 127
R 135		Same as R 127
R 136		Same as R 101
R 137	6R6477	Fixed; carbon; 15K ±10%; 1/2 w; ins.
R 138		Same as R 109
R 139	6R401006	Fixed; carbon; 56K ±5%; 1/2 w; ins.; TA140BW, TA163AW and TA163AX only
R 139S	6R2061	Fixed; carbon; 180K ±5%; 1/2 w; ins.; TA140BS only
R 140		Same as R 139
R 140S		Same as R 139S
R 141	6R5773	Fixed; carbon; 820K ±5%; 1/2 w; ins.
R 142	18K645110	Variable; carbon; 200K ±20%; 1/4 w
R 143		Same as R 128
R 144	6R5772	Fixed; carbon; 47K ±5%; 1/2 w; ins.
R 145		Same as R 3 except p/o Basic Chassis
R 146	6R6040	Fixed; carbon; 880 ohm ±10%; 1/2 w; ins.; TA140BW, TA140BX, TA163AW and TA163AX only
R 146S		Same as R 120; TA140BS only
R 147		Same as R 3 except p/o Basic Chassis
R 148	6R6407	Fixed; carbon; 220K ±10%; 1/2 w; ins.
R 149		Same as R 148
R 150		Same as R 127
R 151		Same as R 13 except p/o Basic Chassis
R 152	6R5796	Fixed; carbon; 560K ±5%; 1/2 w; ins.; TA140BW, TA140BX, TA163AW and TA163AX only
R 152S	6R5773	Fixed; carbon; 820K ±5%; 1/2 w; ins.; TA140BS only
R 153	6R6497	Fixed; carbon; 3.3 megohm ±10%; 1/2 w; ins.
R 154	6R490110	Fixed; carbon; 3.9 megohm ±10%; 1/2 w; ins.
R 155	6R2089	Fixed; carbon; 1.8K ±10%; 1/2 w; ins.
R 156	6R6434	Fixed; carbon; 27K ±10%; 1/2 w; ins.
R 157		Same as R 156
R 158	6R2097	Fixed; carbon; 6.8 megohm ±10%; 1/2 w; ins.
R 159	6R400334	Fixed; carbon; 12 megohm ±10%; 1/2 w; ins.
R 160	6R6475	Fixed; carbon; 680K ±10%; 1/2 w; ins.
R 161		Same as R 101
R 162		Same as R 104
R 163		Same as R 128

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		RESISTORS.
T 1	1V842353	TRANSFORMERS.
		Direct-coupled; base coded BLUE dot; includes two 76A821495 CORE, adjustable tuning; coded YELLOW dot
T 101	25K647479	AF; output; 500 ohm to 3.2 ohm at 55 ma. ddc
		TUBES.
V 101	6AK5	Electron
V 102	6BC5	Electron
V 103	6AB4	Electron
V 104	6BM6	Electron
V 111	12AT7	Electron
V 106	6CB6	Electron
V 107		Same as V 106
V 108		Same as V 106
V 109		Same as V 104
V 110	6B26	Electron
V 114	6AL5	Electron
V 112		Same as V 104
V 113		Electron
V 115	6AG5	Electron
XV 101	9B834083	SOCKETS.
		Tube; female; 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV 102		Same as XV 101
XV 103	9K87124	Tube; female; 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield
XV 104		Same as XV 103
XV 105	9B81243	Tube; female; 9 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV 106		Same as XV 101
XV 107	9B87123	Tube; female; 7 contact; miniature; molded black phenolic base; saddle mounting; includes center shield
XV 108		Same as XV 107
XV 109		Same as XV 107
XV 110		Same as XV 107
XV 111		Same as XV 107
XV 112		Same as XV 107
XV 114	9B86868	Tube; female; 9 contact; miniature; molded black phenolic base; saddle mounting; includes center shield
XV 115		Same as XV 107
XY 102	9A30451	SOCKETS.
		Crystal; female; 4 contact; square; molded mica filled bakelite base; chassis mounted
XY 102	9A824969	Crystal; female; 2 contact; rectangular; stainless steel; chassis mounted
		FILTERS.
	1U814556	TU145 Uni-Channel PERMAKAY IF Filter (Adjacent Channel)
	1U822621	K-9240 Uni-Channel PERMAKAY IF Filter

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CRYSTALS.
Y 101	1U835628	Crystal Units are not part of the Receiver Units and must be ordered separately.
Y 102	1U830014	Crystal Units.
		Quartz; Receiver; IF Oscillator, 4.45 mc; MOTOROLA TYPE G03
		Quartz; Receiver; Control Oscillator; 26.4-32.4 mc; with 6 volt heater unit; MOTOROLA TYPE DMI0 when ordering frequency must be specified.
		Quartz; Receiver; IF Oscillator, 4.45 mc; MOTOROLA TYPE G03

(Narrowed Channel) p/o TA140BS
K-9240 Uni-Channel PERMAKAY IF Filter (Adjacent Channel) p/o TA163AW
K-9240 Uni-Channel TRI-K Filter (Alternate Channel) p/o TA140BX and TA163AX

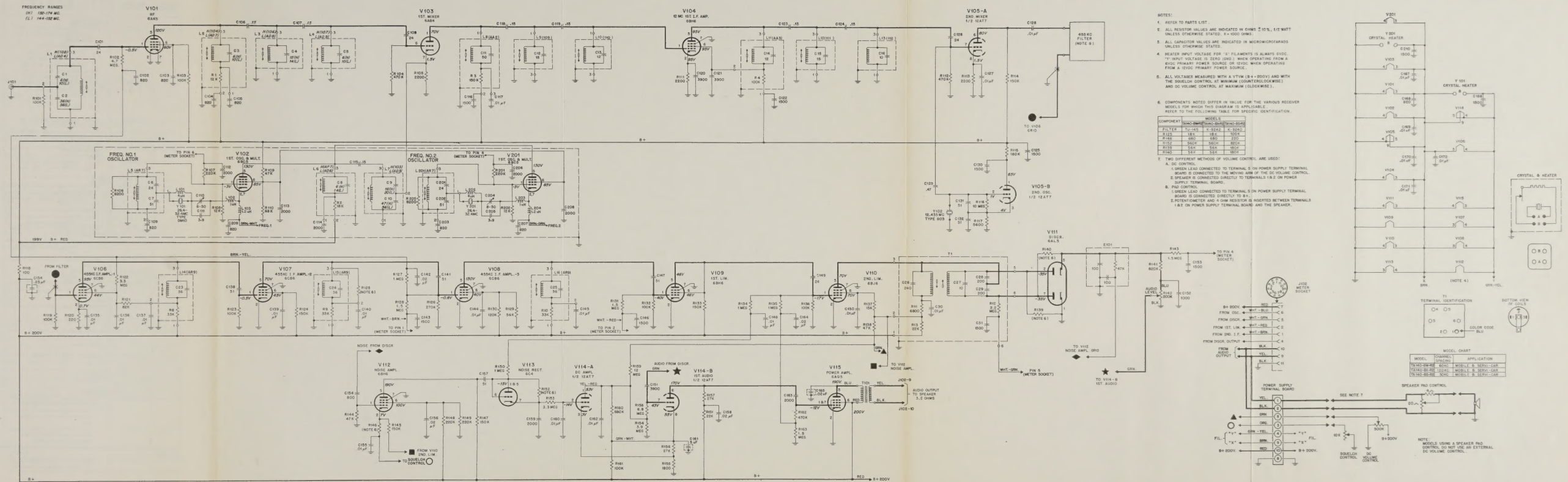
NOTE

Crystal Units are not part of the Receiver Units and must be ordered separately.

CRYSTAL UNITS.

Quartz; Receiver; Control Oscillator; 26.4-32.4 mc; with 6 volt heater unit; MOTOROLA TYPE DMI0 when ordering frequency must be specified.

Quartz; Receiver; IF Oscillator, 4.45 mc; MOTOROLA TYPE G03



Components unique for Two-Frequency
Receiver Chassis are as follows:

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
CAPACITORS,		
C 8H	21R791561	Fixed: ceramic; tubular; 6 uuf ±.5 uuf; 500 vdcw; p/o L 6H (24B838987) Note: Replaces C 8H (21R490602) p/o L 6H (24K824105) used only in 1-Frequency operation
C 201	21K840716	Fixed: ceramic; disc; 24 uuf ±5%; 500 vdcw; p/o L 201
C 202	21K840711	Fixed: molded silver mica; 51 uuf ±5%; 500 vdcw; p/o L 201
C 203		NOT USED
C 204		NOT USED
C 205	21K838284	Fixed: ceramic; disc; 3.9 uuf ±.25 uuf; 250 vdcw
C 206	21K837746	Fixed: ceramic; disc; 2000 uuf ±10%; 500 vdcw
C 207		Same as C 203
C 208		Same as C 206
C 209		Same as C 203
C 210	21B800801	Fixed: ceramic; disc; 1500 uuf GMV ±100% max.; 500 vdcw
COILS,		
L 6H	24B838987	RF: 1st Multiplier; base stamped AP7; includes: 76A838181 CORE, adjustable tuning Note: Replaces L 6H (24K824105) used only in 1-Frequency operation
L 201	24B840709	RF: 2nd Oscillator; base stamped AR7; includes: 46K881276 CORE, adjustable tuning; coded ORANGE dot
L 202	24A840728	RF: choke; 4 uh; coded WHT-BLU dot
L 203	24B840042	RF: choke; 1 uh; coded RED-BLK dot
L 204	24K840559	RF: choke; 1.2 uh; coded BLK- GRN dot
RESISTORS,		
R 201	6R400066	Fixed: carbon; 220K ±5%; 1/2 w; ins.
R 202	6R2075	Fixed: carbon; 12K ±5%; 1/2 w; ins.
R 203		NOT USED
R 204		NOT USED
R 205	6R400490	Fixed: carbon; 8.2K ±5%; 1/2 w; ins.
TUBE,		
V 201	6BC5	Electron
SOCKETS,		
XV 201	9B834083	Tube: female; 7 contact; miniature molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XY 201	9A30451	Crystal: female; 4 contact; square molded mica filled bakelite base; chassis mounted

FILTERS

1U831456	TU145 Uni-Channel PERMAKAY IF Filter (Adjacent Channel)
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REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
	1U822621	p/o TA140BW-R2 K-9240 Uni-Channel PERMAKAY IF Filter (Narrowed Channel)
	1U820043	p/o TA140BS-R2 K-9242 Uni-Channel TRI-KAY IF Filter (Alternate Channel) p/o TA140BX-R2

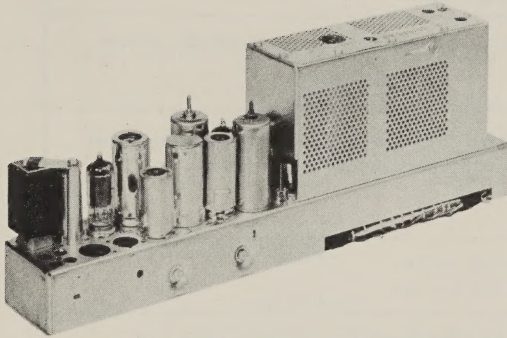
CRYSTALS

NOTE

Crystal Units are not part of the
Receiver Units and must be ordered
separately.

CRYSTAL UNITS,		
Y 101	1U835628	Quartz: Receiver Control Oscillator; 26.4-32.4 MC; with 6 volt heater unit; MOTOROLA TYPE DM10; when ordering frequency must be specified
Y 102	1U830014	Quartz: Receiver IF Oscillator; 12.455 MC; MOTOROLA TYPE G03
Y 201		Same as Y 101

TRANSMITTER CHASSIS



MODEL TA139A TRANSMITTER

four stages of frequency multiplication; a final power amplifier and a "Pi" section harmonic filter.

The MOTOROLA I.D.C. circuit is integral part of the transmitter. This circuit limits modulation deviation to 100%. An adjustable control permits deviation regulation to any value dictated by channel width requirements.

All of the transmitter operating voltages are supplied by a separate power supply chassis. RF power output is dependant upon the power supply and the bias and plate voltages applied to the doubler-driver and power amplifier stages of the transmitter. In application with the mobile and AC power supplies described in this instruction manual, transmitter RF power output is a nominal 20-25 watts (depending on operating frequency) or a nominal 10 watts.

The TA139A-C2 Transmitter is identical to corresponding single-frequency version with the exception that a second RF oscillator circuit is added. The two-frequency unit may be operated with frequencies separated at a maximum of ± 300 kc from circuit resonance without degradation of single-frequency nominal performance specifications. Two-frequency transmitters are normally phased at the factory on the higher of the two frequencies employed. In specific cases where channel separations exceed these limitations and where one channel is used much more frequently than the other, the transmitter may be aligned on the primary frequency (frequency most often used). When re-aligning the transmitter, it is recommended that this phasing procedure be observed to afford optimum performance.

MODEL DESIGNATION	CHANNELS	CRYSTALS REQUIRED
TA139A	1-FREQ.	(1) DS1
TA139A-C2	2-FREQ.	(2) DS1

1. DESCRIPTION

a. Design

The MOTOROLA Model TA139A "G" Transmitter is a 144-174 mc FM radio transmitter expressly designed for mobile and AC utility applications. The unit incorporates 9 tubes and 11 tuned circuits exclusive of the primary oscillator coil. Basic transmitter circuitry includes a crystal controlled oscillator, a single angular phase modulator controlled by the MOTOROLA INSTANTANEOUS DEVIATION CONTROL circuit,

MOTOROLA Communications and Electronics Division

Engineering Publications 4501 W. Augusta Blvd. Chicago 51, Illinois

SCHEMATIC DIAGRAM PARTS LIST

Model: TA140B-W-R2, TA140BX-R2 and TA140BS-R2
SENSICON "G" Receiver Units (144-174 Mc.)Reference:
Schematic Diagram
63B839288NOTE
Components unique for two-frequency are
itemized at the end of this parts list.When ordering replacement parts, specify part
number, description, schematic diagram number,
diagram issue and reference symbol of the part.
The value of certain components included in the
1 to 39 series reference symbols will vary for
different frequency ranges. Where such varia-
tions occur, the components are identified by
the suffixes L and H following the reference
symbol. Suffix "L" indicates the 144-152 mc.
range; "H" indicates the 152-174 mc. range.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C 11.	21R490602	CAPACITORS. Fixed: ceramic; tubular; 10 uuf a5%, 500 vdcw; p/o L 1L
C 11H	21R490072	Fixed: ceramic; tubular; 6 uuf a 5 uuf; 500 vdcw; p/o L 1H
C 22.	21R114052	Fixed: ceramic; tubular; 56 uuf a10%, 500 vdcw; p/o L 1L
C 23H	21R87127	Fixed: ceramic; tubular; 36 uuf a5%, 500 vdcw; p/o L 1H
C 31.	21R121918	Same as C 1L except p/o L 2L
C 3H	21R121918	Fixed: ceramic; tubular; 6 uuf a 5 uuf; 500 vdcw; p/o L 2H
C 4L	21R836528	Fixed: ceramic; disc; 14 uuf a5%, 500 vdcw; p/o L 3L
C 4H	21R490605	Fixed: ceramic; tubular; 12 uuf a10%, 500 vdcw; p/o L 3H
C 5L	21R490605	Same as C 1L except p/o L 4L
C 5H	21R490605	Fixed: ceramic; disc; 24 uuf a5%, 500 vdcw; p/o L 5
C 6	21R840716	Fixed: molded silver mica; 51 uuf a5%, 500 vdcw; p/o L 5
C 6L	21R836528	Fixed: ceramic; disc; 14 uuf a5%, 500 vdcw; p/o L 6L
C 8H	21R31492	Same as C 1L except p/o L 6H
C 9L	21R319296	Fixed: ceramic; tubular; 20 uuf a5%, 500 vdcw; p/o L 7L
C 10H	21R131453	Fixed: ceramic; tubular; 17 uuf a10%, 500 vdcw; p/o L 7H
C 11	21R847573	Fixed: ceramic; tubular; 50 uuf a5%, 500 vdcw; p/o L 8
C 12	21R475262	Fixed: ceramic; tubular; 15 uuf a5%, 500 vdcw; p/o L 9
C 13	21R475261	Fixed: ceramic; tubular; 12 uuf a5%, 500 vdcw; p/o L 10
C 14	21R890124	Same as C 13 except p/o L 11
C 15	21R890124	Same as C 12 except p/o L 12
C 16	21R890124	Fixed: ceramic; tubular; 10 uuf a5%, 500 vdcw; p/o L 13
C 23	21R840048	Same as C 2H except p/o L 14
C 24	21R840048	Same as C 2H except p/o L 15
C 25	21R840048	Same as C 2H except p/o L 16
C 26	21R840048	Fixed: molded silver mica; 240 uuf a5%, 500 vdcw; p/o T 1
C 27	21R840081	Fixed: ceramic; disc; 10 uuf a5%, 500 vdcw; p/o T 1
C 28	21R840081	Fixed: molded silver mica; 200 uuf a5%, 500 vdcw; p/o T 1
C 29	21R840081	Same as C 28 except p/o T 1

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C 30	21A801139	CAPACITORS. Fixed: ceramic; disc; .01 uuf a40-10%; 400 vdcw; p/o T 1
C 31	21B800801	Fixed: ceramic; disc; 1500 uuf GMV a100% max.; 500 vdcw; p/o T 1
C 101	21R840365	Fixed: ceramic; disc; 24 uuf a5%, 500 vdcw
C 102	21B837745	Fixed: ceramic; disc; 820 uuf a10%, 500 vdcw
C 103		Same as C 102
C 104		Same as C 102
C 105		Same as C 102
C 106	21R881064	Fixed: molded phenolic; tubular; 15 uuf a10%, 500 vdcw
C 107		Same as C 106
C 108		Same as C 101
C 109		Same as C 102
C 110	20B840719	Variable; alr; 8 uuf min. to 50 uuf max.
C 111	21R838284	Fixed: ceramic; disc; 3.9 uuf a 25 uuf; 250 vdcw
C 112	21R837746	Fixed: ceramic; disc; 2000 uuf a10%, 500 vdcw
C 113		Same as C 112
C 114		Same as C 106
C 115		Same as C 31 except p/o Basic Chassis
C 116		Same as C 10 except p/o Basic Chassis
C 117		Fixed: ceramic; tubular; 56 uuf a10%, 500 vdcw; p/o L 1L
C 118		Same as C 106
C 119		Fixed: ceramic; disc; 3900 uuf a10%, 500 vdcw
C 120	21R837996	Fixed: ceramic; disc; 3900 uuf a10%, 500 vdcw
C 121		Same as C 120
C 122		Fixed: oil filled; tubular; .02 uuf a20%; 400 vdcw
C 123		Same as C 106
C 124		Same as C 106
C 125		Same as C 31 except p/o Basic Chassis
C 126		Same as C 101
C 127		Same as C 10 except p/o Basic Chassis
C 128		Fixed: molded phenolic; tubular; 47 uuf a20%; 500 vdcw
C 129	21R83994	Fixed: ceramic; disc; 14 uuf a5%, 500 vdcw; p/o L 6H
C 130		Same as C 31 except p/o Basic Chassis
C 131		Same as C 7 except p/o Basic Chassis
C 132		Same as C 7 except p/o Basic Chassis
C 133		Fixed: ceramic; tubular; 20 uuf a5%, 500 vdcw; p/o L 7H
C 134	8A982986	Fixed: oil filled; tubular; .25 uuf a20%; 400 vdcw
C 135		Same as C 30 except p/o Basic Chassis
C 136		Same as C 30 except p/o Basic Chassis
C 137		Fixed: ceramic; tubular; 12 uuf a5%, 500 vdcw; p/o L 10
C 138		Same as C 13 except p/o L 11
C 139		Same as C 12 except p/o L 12
C 140		Fixed: ceramic; tubular; 10 uuf a5%, 500 vdcw; p/o L 13
C 141		Same as C 2H except p/o L 14
C 142	21B840129	Fixed: ceramic; disc; .02 uuf a40-10%; 400 vdcw
C 143		Same as C 31 except p/o Basic Chassis

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C 144		CAPACITORS. Same as C 30 except p/o Basic Chassis
C 145		Same as C 30 except p/o Basic Chassis
C 146		Same as C 31 except p/o Basic Chassis
C 147		Same as C 7 except p/o Basic Chassis
C 148		Same as C 30 except p/o Basic Chassis
C 149		Same as C 101
C 150		Same as C 30 except p/o Basic Chassis
C 151		Same as C 120
C 152	21R847601	Fixed: molded silver mica; 1000 uuf a5%; 500 vdcw
C 153		Same as C 31 except p/o Basic Chassis
C 154	21R840049	Fixed: molded sil. mica; phenolic coated; 800 uuf a5%; 300 vdcw
C 155		Same as C 142
C 156		Same as C 142
C 157		Same as C 7 except p/o Basic Chassis
C 158		Same as C 142
C 159		Same as C 112
C 160		Same as C 30 except p/o Basic Chassis
C 161	21R890624	Fixed: electrolytic; tubular; 5 uuf a100-15%; 150 vdcw
C 162		Same as C 30 except p/o Basic Chassis
C 163		Same as C 112
C 164		Same as C 142
C 165	8K85984	Fixed: oil filled; tubular; 102 uuf a20%; 400 vdcw
C 166		Same as C 31 except p/o Basic Chassis
C 167		Same as C 30 except p/o Basic Chassis
C 168		Same as C 102
C 169		Same as C 30 except p/o Basic Chassis
C 170		Same as C 10 except p/o Basic Chassis
C 171		Same as C 30 except p/o Basic Chassis
C 172		Same as C 31 except p/o Basic Chassis
C 173		Same as C 7 except p/o Basic Chassis
C 174		Same as C 7 except p/o Basic Chassis

CAPACITOR-RESISTOR
ASSEMBLY.
Tubular; consisting of:
Dual CAPACITOR; printed
circuit; silver point on
ceramic form; each section
100 uuf; 300 vdcw
One RESISTOR; fixed; carbon
47K a20%CONNECTORS.
Receptacle; female; single
contact; round molded mica
filled phenolic base; for 1/8"
diameter male pin connector
Receptacle; female; 11 contact;
polarized; round molded
black plastic base; chassis
mounted; does not include
42A821428 RING, connector
retainer; which must be
ordered separately
Receptacle; male; 11 contact;
polarized; round; black
phenolic base; saddle

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
L 1.	24K363515	COILS. RF; Antenna; base stamped AD4; includes 76A824120 CORE, adjustable tuning
L 1H	24B262102	RF; Antenna; base stamped AD4; includes 76A824120 CORE, adjustable tuning
L 2L	24K363518	RF; Mixer; base stamped AD7; includes 76A824120 CORE, adjustable tuning
L 2H	24B262104	RF; Mixer; base stamped AD7; includes 76A824120 CORE, adjustable tuning
L 3L	24K363519	RF; Coupling; base stamped AD8; includes 76A824120 CORE, adjustable tuning
L 3H	24B262106	RF; Coupling; base stamped 106; includes 76A824120 CORE, adjustable tuning
L 4L	24K363620	RF; Mixer Grid; base stamped AD9; includes 76A824120 CORE, adjustable tuning
L 4H	24K824107	RF; Mixer Grid; base stamped 107; includes 76A824120 CORE, adjustable tuning
L 5	24B840709	RF; 1st Oscillator; base stamped AR7; includes 46K881276 CORE, adjustable tuning; coded ORANGE dot
L 6L	24K363517	RF; 1st Multiplier; base stamped AD6; includes 76A824120 CORE, adjustable tuning
L 6H	24K824105	RF; 1st Multiplier; base stamped 105; includes 76A824120 CORE, adjustable tuning
L 7L	24K363516	RF; Injection; base stamped AD5; includes 76A824120 CORE, adjustable tuning
L 7H	24K824103	RF; Injection; base stamped 103; includes 76A824120 CORE, adjustable tuning
L 8	24K363778	IF; 5.5 mc IF - 1; base stamped AAJ; includes 76A824118 CORE, adjustable tuning
L 9	24B262109	IF; 5.5 mc IF - 2; base stamped 109; includes 76A824118 CORE, adjustable tuning
L 10	24B262110	IF; 5.5 mc IF - 3; base stamped 110; includes 76A824118 CORE, adjustable tuning
L 11	24K363779	IF; 5.5 mc IF - 4; base stamped AAJ; includes 76A824118 CORE, adjustable tuning
L 12	24K824111	IF; 5.5 mc IF - 5; base stamped 111; includes 76A824118 CORE, adjustable tuning
L 13	24K824112	IF; 5.5 mc IF - 6; base stamped 112; includes 76A824118 CORE, adjustable tuning
L 14	24K840542	IF; 5.5 mc IF - 1; base stamped AR9; includes 46K891110 CORE, adjustable tuning; coded ORANGE dot
L 15		Same as L 14 except 2nd IF - 2
L 16		Same as L 14 except 2nd IF - 3
L 101	24A840728	RF; choke; 4 microhenries;

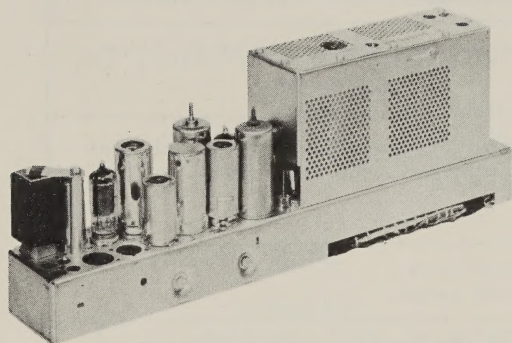
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
L 102	24B840462	COILS. coded WHT-BLU dot RF; choke; 1 microhenries; coded RED-BLK dot
L 103	24K840559	RF; choke; 1.2 microhenries; coded BLK-GRN dot
R 1	6R6394	RESISTORS. Fixed: carbon; 12K a10%; 1/2 w; ins.; p/o L 2
R 2	6R5951	Fixed: carbon; 18K a10%; 1/2 w; ins.; p/o L 5
R 3	6R6398	Fixed: carbon; 150K a5%; 1/2 w; ins.; p/o L 8
R 4	6R6031	Fixed: carbon; 100K a10%; 1/2 w; ins.; p/o L 11
R 5		NOT USED
R 6		NOT USED
R 7		NOT USED
R 8	6R4410	Fixed: carbon; 33K a10%; 1/2 w; ins.; p/o L 14
R 9		Same as R 8 except p/o L 15
R 10		Fixed: carbon; 6.8K a10%; 1/2 w; ins.; p/o L 16
R 11	6R6428	Fixed: carbon; 22K a10%; 1/2 w; ins.; p/o T 1
R 12	6R6433	Fixed: carbon; 2.2 megohm a10%; 1/2 w; ins.; p/o T 1
R 13	6R6397	Fixed: carbon; 22K a10%; 1/2 w; ins.; p/o T 1
R 1405	6R5573	Fixed: carbon; 100K a5%; 1/2 w; ins.
R 142	18K945110	Fixed: carbon; 4.7 megohm a10%; 1/2 w; ins.
R 143		Fixed: carbon; 47K a5%; 1/2 w; ins.
R 144	6R5772	Fixed: carbon; 47K a5%; 1/2 w; ins.
R 145	6R6069	Fixed: carbon; 2.2K a10%; 1/2 w; ins.
R 106	6R400490	Fixed: carbon; 8.2K a5%; 1/2 w; ins.; TA140B-W, TA140BX, TA140B-W and TA140B-W
R 107	6R400066	Fixed: carbon; 220K a5%; 1/2 w; ins.
R 108	6R2075	Fixed: carbon; 12K a5%; 1/2 w; ins.
R 109	6R6048	Fixed: carbon; 47K a10%; 1/2 w; ins.
R 110	6R6479	Fixed: carbon; 68K a5%; 1/2 w; ins.
R 111		Same as R 105
R 112		Same as R 104
R 113		Same as R 105
R 114		Same as R 3 except p/o Basic Chassis
R 115	6R6444	Fixed: carbon; 180K a10%; 1/2 w; ins.
R 116	6R5622	Fixed: carbon; 10 megohm a10%; 1/2 w; ins.
R 117	6R6117	Fixed: carbon; 5.6K a10%; 1/2 w; ins.
R 118	6R6326	Fixed: carbon; 100 ohm a10%; 1/2 w; ins.
R 119		Same as R 101
R 120	6R6270	Fixed: carbon; 220 ohm a10%; 1/2 w; ins.
R 121	6R5644	Fixed: carbon; 82K a10%; 1/2 w; ins.
R 122	6R6497	Fixed: carbon; 3.3 megohm a10%; 1/2 w; ins.
R 123		Same as R 101
R 124	24K840542	IF; 5.5 mc IF - 1; base stamped AR9; includes 46K891110 CORE, adjustable tuning; coded ORANGE dot
R 125	6R5553	Fixed: carbon; 100K a5%; 1/2 w; ins.; TA140BS only

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
R 126	6R6414	Fixed: carbon; 270K a10%; 1/2 w; ins.; TA140B-W, TA140BX, TA140B-W and TA140B-W
R 127	6R6046	Fixed: carbon; 1 megohm a10%; 1/2 w; ins.
R 128	6R400228	Fixed: carbon; 1.5 megohm a5%; 1/2 w; ins.
R 129	6R6378	Fixed: carbon; 56K a10%; 1/2 w; ins.
R 130	6R5631	Fixed: carbon; 120K a10%; 1/2 w; ins.
R 131		Same as R 128
R 132		Same as R 101
R 133		Same as R 127 p/o Basic Chassis
R 134		Same as R 127
R 135		Same as R 101
R 136		NOT USED
R 137	6R4477	Fixed: carbon; 15K a10%; 1/2 w; ins.
R 138		Same as R 109
R 139	6R401006	Fixed: carbon; 56K a5%; 1/2 w; ins.; TA140B-W, TA140BX, TA140B-W and TA140B-W
R 1405	6R2061	Fixed: carbon; 180K a5%; 1/2 w; ins.; TA140BS only
R 141	6R5773	Fixed: carbon; 820K a5%; 1/2 w; ins.
R 142	18K945110	Fixed: carbon; 200K a20%; 1/2 w; ins.
R 143		Same as R 128
R 144	6R5772	Fixed: carbon; 47K a5%; 1/2 w; ins.
R 145		Same as R 3 except p/o Basic Chassis
R 146	6R6040	Fixed: carbon; 680 ohm a10%; 1/2 w; ins.; TA140B-W, TA140BX, TA140B-W and TA140B-W
R 1465		Same as R 120; TA140BS only
R 147		Same as R 3 except p/o Basic Chassis
R 148	6R6407	Fixed: carbon; 220K a10%; 1/2 w; ins.
R 149		Same as R 148
R 150		Same as R 127
R 151		Same as R 104
R 152	6R5796	Fixed: carbon; 560K a5%; 1/2 w; ins.; TA140B-W, TA140BX, TA140B-W and TA140B-W
R 1528	6R5773	Fixed: carbon; 820K a5%; 1/2 w; ins.; TA140BS only
R 153	6R6497	Fixed: carbon; 3.3 meg a10%; 1/2 w; ins.
R 154	6R490110	Fixed: carbon; 3.9 megohm a10%; 1/2 w; ins.
R 155	6R2089	Fixed: carbon; 1.8K a10%; 1/2 w; ins.
R 156	6R6434	Fixed: carbon; 27K a10%; 1/2 w; ins.
R 157		Same as R 156
R 158	6R2097	Fixed: carbon; 6.8 megohm a10%; 1/2 w; ins.
R 159	6R400334	Fixed: carbon; 12 megohm a10%; 1/2 w; ins.
R 160	6R6475	Fixed: carbon; 680K a10%; 1/2 w; ins.
R 161		Same as R 101
R 162		Same as R 104
R 163		Same as R 128

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
T 1	1V842353	TRANSFORMERS. Description: base coded BLUE dot; includes 2e 76A821495 CORE, adjustable tuning; coded YELLOW AF; output: 5000 ohm to 3.2 ohm at 55 ma. dc
V 101	6AK5	Electron
V 102	6BC5	Electron
V 103	6AB4	Electron
V 104	6BH6	Electron
V 105	12AT7	Electron
V 106	6CB5	Electron
V 107		Same as V 106
V 108		Same as V 106
V 109		Same as V 106
V 110	6BJ6	Electron
V 111	6AL5	Electron
V 112		Same as V 104
V 113	6C4	Electron
V 114		Same as V 105
V 115	6AQ5	Electron
XV 101	9B834083	SOCKETS. Tube; female; 7 contact; miniature; molded mica filled phenolic base; addie mounting; includes center shield and tube shield base Note: Replace L 6H (24K824105) used only in 1-Frequency operation
XV 102	9K87124	Tube; female; 7 contact; miniature; molded mica filled phenolic base; addie mounting; includes center shield
XV 103		Same as XV 101
XV 104		Tube; female; 9 contact; miniature; molded mica filled phenolic base; addie mounting; includes center shield and tube shield base
XV 105	9B881243	Tube; female; 9 contact; miniature; molded mica filled phenolic base; addie mounting; includes center shield and tube shield base
XV 106	24A840728	RF; choke; 4 uH; coded WHT-BLU dot
XV 107	24B840942	RF; choke; 1 uH; coded RED-BLK dot
XV 108	24K840559	Fixed: carbon; 1.2 uH; coded BLK- GRN dot
XV 109		Same as XV 101
XV 110	9B87123	Tube; female; 7 contact; miniature; molded black phenolic base; addie mounting; includes center shield
XV 111		Same as XV 107
XV 112		Same as XV 107
XV 113	9B8668	Tube; female; 9 contact; miniature; molded black phenolic base; addie mounting; includes center shield
XV 114		Same as XV 107
XV 115		Same as XV 107
XY 102	9A10451	SOCKETS. Tube; female; 7 contact; miniature; molded mica filled phenolic base; addie mounting; includes center shield and tube shield base
XY 102	9A82469	Crystal; female; 2 contact; rectangular; sapphire base; chassis mounted

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C 8H	21R791561	CAPACITORS. Fixed: ceramic; tubular; 6 uuf a 5 uuf; 500 vdcw; p/o L 4H (24B83987) Note

TRANSMITTER CHASSIS



MODEL TA139A TRANSMITTER

four stages of frequency multiplication; a final power amplifier and a "Pi" section harmonic filter.

The MOTOROLA I. D. C. circuit is integral part of the transmitter. This circuit limits modulation deviation to 100%. An adjustable control permits deviation regulation to any value dictated by channel width requirements.

All of the transmitter operating voltages are supplied by a separate power supply chassis. RF power output is dependant upon the power supply and the bias and plate voltages applied to the doubler-driver and power amplifier stages of the transmitter. In application with the mobile and AC power supplies described in this instruction manual, transmitter RF power output is a nominal 20-25 watts (depending on operating frequency) or a nominal 10 watts.

The TA139A-C2 Transmitter is identical to corresponding single-frequency version with the exception that a second RF oscillator circuit is added. The two-frequency unit may be operated with frequencies separated at a maximum of ± 300 kc from circuit resonance without degradation of single-frequency nominal performance specifications. Two-frequency transmitters are normally phased at the factory on the higher of the two frequencies employed. In specific cases where channel separations exceed these limitations and where one channel is used much more frequently than the other, the transmitter may be aligned on the primary frequency (frequency most often used). When re-aligning the transmitter, it is recommended that this phasing procedure be observed to afford optimum performance.

MODEL DESIGNATION	CHANNELS	CRYSTALS REQUIRED
TA139A	1-FREQ.	(1) DS1
TA139A-C2	2-FREQ.	(2) DS1

I. DESCRIPTION

a. Design

The MOTOROLA Model TA139A "G" Transmitter is a 144-174 mc FM radio transmitter expressly designed for mobile and AC utility applications. The unit incorporates 9 tubes and 11 tuned circuits exclusive of the primary oscillator coil. Basic transmitter circuitry includes a crystal controlled oscillator, a single angular phase modulator controlled by the MOTOROLA INSTANTANEOUS DEVIATION CONTROL circuit,

MOTOROLA Communications and Electronics Division

Engineering Publications 4501 W. Augusta Blvd. Chicago 51, Illinois

GUARANTEED PERFORMANCE SPECIFICATIONS

BASIC UNIT	TA139A Series	
FREQUENCY	144-174 mc	
CRYSTAL MULTIPLICATION	Twenty-four (24) times	
NOMINAL RF POWER OUTPUT	25 Watts: 144-167 mc or 20 Watts: 167-174 mc 10 Watts: 144-174 mc	
POWER SOURCE	Separate Vibrator Power Supply operating from 6 3 VDC or 12 VDC battery source, or AC Power Supply operating from 117 VAC - 60 cycle source.	
SPURIOUS AND HARMONIC EMISSION	All spurious and harmonic emissions are attenuated at least 60 db. below carrier level	
FREQUENCY STABILITY AND TEMPERATURE RANGE	Using an oven type crystal unit the carrier is maintained to within ± 1 kc of assigned center frequency or approximately $\pm .0006\%$ from -30°C. to +60°C. ambient (+25°C. reference).	
MODULATION	40F3: ± 15 kc deviation for 100% at 1000 cycles ± 5 kc deviation for 100% at 1000 cycles	
AUDIO INPUT LEVEL	Mil. Mic. or .25 V in series with 50 ohm input for 100% at 1000 cps. Equivalent: (Approx. -17 db) Handset: .18 V in series with 50 ohm input for 100% at 1000 cps. (Approx. -20 db)	
TUBE COMPLEMENT AND FUNCTION	(1) 6AK6 - Oscillator (1-Freq.) or (2) 6AK6 - Oscillator (2-Freq.) (1) 12AT7 - Mod. Buffer-Doubler (1) 6AU6 - Tripler (1) 6AK6 - 2nd Doubler (1) 2E26 - Doubler Driver (1) 6146 - Power Amplifier (1) 6BH6 - I. D. C. Amplifier (1) 6AL5 - Clipper	
NUMBER OF TUNED CIRCUITS	11 tuned circuits following the modulator including 4 double tuned multiple stages, a multiple adjusted output circuit and a "Pi" section harmonic filter.	
PLATE VOLTAGE REQUIREMENTS	Approx. 395 VDC at 150 ma. Approx. 270 VDC at 105 ma. Approx. 135 VDC at 18 ma. Approx. -20 VDC Bias	
DIMENSIONS	2-3/8" wide x 5-1/4" high x 15" long	
WEIGHT	4-1/4 lbs.	

FCC LICENSE DESIGNATION: TA139A
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

2. CHASSIS COMPLEMENT

a. MOTOROLA Model TA139A is comprised of:

- (1) TU187A Basic single-frequency transmitter chassis

Includes: (1) TK186A Coil Kit

Uses: (1) DS1 Control

Crystal

b. MOTOROLA Model TA139A-C2 is comprised of:

- (1) TU187A-C2 Basic two-frequency transmitter chassis

Includes: (1) TK186A-C2 Coil Kit

Uses: (2) DS1 Control Crystals

3. PRE-ALIGNMENT NOTES

IMPORTANT

F.C.C. regulations state that a radio transmitter may be tuned or adjusted only by a radio operator holding a duly authorized Radiotelephone License of applicable class or by personnel working under direct supervision of the same.

a. Factory Alignment

The transmitter was tuned and adjusted for its exact operating frequency prior to shipment from the factory. Unless it has been handled roughly while in transit or otherwise abused or tampered with, it should require no further adjustment, other than alignment of the final RF amplifier stage to the antenna, before placing it in service. If, for any reason, it becomes necessary for the transmitter to be retuned, the following alignment instructions outline the correct procedure.

Bear in mind, however, that meter readings will vary with change in battery voltage and will decrease with an increase in the life of the tubes and other components of the transmitter. Each time a transmitter is aligned or tested, the readings should be entered in a logbook.

b. Frequency Calculations

Transmitter crystal frequency and/or carrier frequency may be determined as follows:

f_c = carrier frequency

f_o = crystal frequency

$$f_o = \frac{f_c}{24} \quad f_c = 24f_o$$

Example: $f_c = 153.60 \text{ mc}$

$$f_o = \frac{153.60}{24}$$

$f_o = 6.40 \text{ mc or } 6400 \text{ kc}$

c. Test Equipment

- (1) One MOTOROLA P-8501-A Portable Test Set.

The MOTOROLA P-8501-A Test Set is designed and engineered for use with all MOTOROLA "RESEARCH" Line equipment. Simplified meter switching, an expanded meter range, and two crystal sockets have made the P-8501-A Test Set a universal instrument for the testing and alignment of MOTOROLA transmitters and receivers.

Read the instructions included with the test set carefully before attempting alignment.

Any 0-50 microampere meter with an equivalent series resistance of 20,000 ohms may be used as a metering device. The meter should be connected from chassis ground to the pin receptacle of the metering socket corresponding to the stage being measured. Refer to the applicable schematic diagram for specific metering pin receptacle information.

- (2) One Alignment Tool Kit (MOTOROLA K-9321).

- (3) One RF wattmeter or dummy antenna. (Refer to applicable dummy antenna detail.)

- (4) One power supply (preferably the power supply designed for the transmitter under test).

d. Preliminary "Set-Up" for Alignment

- (1) Connect a dummy antenna or RF wattmeter, to the transmitter antenna receptacle.

- (2) Connect the MOTOROLA portable test set to the metering receptacle on the transmitter chassis. (Refer to Parts Location Detail.)

- (3) Portable test set switch positions for transmitter metering:

- (a) Place GRID CURRENT-METER-FIELD STRENGTH switch in the METER position.

(b) Place the REC-XMTR-0-50 ua. switch in the XMTR position.

(4) Transmitter keying procedure:

When transmitter keying alone is required, the XMTR-ON switch of the portable test set may be used for this purpose. The XMTR-ON switch is connected in parallel with the push-to-talk terminals of the MIC receptacle but does not complete the microphone talk circuit. When it is required to modulate as well as to key the transmitter, connect a MOTOROLA P-255-A Microphone or equivalent into the MIC receptacle on the portable test set.

(5) Be sure the power supply is connected to the transmitter.

(6) Place the HI-LO power switch mounted on the power supply chassis in the LO position. This step applies only for power supplies utilized in 25 watt models.

(7) Turn the equipment "on" to apply filament voltage to the transmitter and allow a 30 second warm-up period before applying high voltage (keying).

CAUTION

Although it is necessary to turn the transmitter plate voltage "on" to take meter readings and to make adjustments, never have the transmitter plate voltage turned "on" for more than a few seconds at a time until the transmitter is completely tuned. The plate current is high in untuned stages and may result in damage to tubes and parts if the transmitter is "on" for too long a period before the stages are completely aligned.

To make adjustments, turn the transmitter "on" by means of the push-to-talk button on the microphone or the XMTR-ON switch on the test set.

e. Two-Frequency Considerations

Two-frequency transmitters should normally be phased on the higher of the two frequencies employed. On completion of alignment, each frequency should be checked for proper output performance. In specific cases where channel separations exceed 300 kc and the lower frequency is used much more frequently than the higher, it may be preferable to phase the unit on the lower frequency.

NOTE

Check transmitter model on MOTOROLA Cross Reference Chart, Part Number EPD #290.

f. MOTOROLA Portable Test Set Switch Positions and Corresponding Circuits

SWITCH POSITION	CIRCUIT
1	No Connection
2	Osc. Grid
3	Tripler Grid
-4	2nd Doubler Grid
+4 (PA)	Power Amplifier Plate Current
5	Doubler-Driver Grid
6	Power Amplifier Grid
7	Power Amplifier Plate Voltage
8	Push-to-Talk Circuit

4. ALIGNMENT INTRODUCTION

All adjustments for routine alignment of the transmitter are accessible from the top of the chassis. Coils T 1 and T 2, which have their primary slugs located on the bottom of the chassis are factory adjusted for optimum performance on the operating frequency of the transmitter and should normally require no further adjustment in the field. The primaries of these coils are sealed to prevent inadvertent detuning. For routine realignment of the transmitter, such as may be required when replacing tubes or other circuit components, follow the procedure outlined in the ROUTINE MAINTENANCE ALIGNMENT CHART.

The more detailed COMPREHENSIVE ALIGNMENT PROCEDURE as described in paragraph 5 is expressly applicable for complete realignment of the transmitter such as may be required when changing transmitter frequency or replacing transformer coils T 1 or T 2. This procedure is most suitable for laboratory bench alignment.

5. COMPREHENSIVE ALIGNMENT PROCEDURE

a. Adjustment, Oscillator Coil L 1 & C 134

Capacitor C 134 located beneath and at the end of the chassis is the oscillator frequency ad-

justment capacitor and is preset for the assigned frequency at the factory. Coil L 1 located adjacent to the crystal is the oscillator activity adjustment. Its principle purpose is to set the oscillator to maximum activity for the crystal used, however, it can be used as a frequency warping device within narrow limits. It is also factory preset. The setting of L 1 and/or C 134 should not be changed in the field. Should the setting of L 1 or C 134 be accidentally altered or the crystal replaced it will be necessary to adjust the transmitter to the correct frequency. This should be done with a primary or secondary frequency standard only. A MOTOROLA F4MU-24B Series Frequency Monitor may be used for this purpose. The oscillator frequency adjustment procedure is as follows:

(1) Set condenser C 134 to half capacity. This condition occurs when the condenser screw-driver slot is set the long way of the chassis.

(2) With the selector switch on the Motorola Test Set in position 2, adjust the oscillator Coil L 1 for maximum meter indication. This will indicate maximum oscillator activity.

(3) Warp oscillator into frequency by means of C 134.

NOTE

Once the oscillator has been properly set for maximum activity and on frequency as described above, minor frequency adjustments can be made using L 1 only. The serviceman should remember, however, that this will shift the oscillator slightly off peak activity so that if it is necessary to warp a considerable distance, the method of steps (1), (2) & (3) should be employed.

When it is necessary to adjust operating frequencies for two-frequency transmitters, first set the No. 1 oscillator "on-frequency" by the method above and then set the No. 2 oscillator to its correct frequency. Check the first oscillator and reset the adjustment if necessary; then check and reset the second oscillator if necessary. After completing the adjustment, be sure to replace the guard plate over the coils.

b. Adjustment, 1st Doubler Transformer T 1

(1) Set the meter switch on the test set to position 3.

(2) Adjust the primary slug from the bottom of the transformer for maximum meter reading.

(3) Adjust the secondary slug from the top of the transformer for maximum meter reading. This circuit is tuned to two times crystal frequency.

c. Adjustment, Tripler Transformer, T 2

(1) Set the meter switch on the test set to position -4.

(2) Adjust the primary slug from the bottom of the transformer for maximum meter reading.

(3) Adjust the secondary slug from the top of the transformer for maximum meter reading. This circuit is tuned to six times crystal frequency.

(4) Repeak T 1 for maximum meter reading with the meter switch in position -4.

d. Adjustment, 2nd Doubler Coils L 106, L 107

(1) Set the meter switch on the test set to position 5.

(2) Adjust Coil L 106 for maximum meter reading.

(3) Adjust Coil L 107 for maximum meter reading. This circuit is tuned to twelve times crystal frequency.

(4) Repeak T 2 for maximum meter reading with the meter switch in position 5.

e. Adjustment, Doubler Driver Plate Capacitor C 119 and PA Grid Capacitor C 121

(1) Set the meter switch on the test set to position 6.

(2) Adjust capacitor C 119 for maximum meter reading.

(3) Adjust capacitor C 121 for maximum meter reading. This circuit is tuned to twenty-four times crystal frequency.

NOTE

A fixed reading in position 6 does not indicate proper alignment of C 119 and C 121. The fixed bias supplied by the power supply will always provide a meter reading in position 6. Proper alignment of C 119 and C 121 will be indicated by a definite tuning peak on the meter.

f. Adjustment, Power Amplifier

(1) Set the meter selector switch to the PA (+4) position.

(2) With the 66A891487 alignment tool adjust ANT TRIMMER capacitor C 125 for minimum coupling, which is indicated by minimum plate current.

(3) Turn output ANT COUPLING adjustment fully clockwise to decouple the dummy load or wattmeter.

(4) Adjust PA TUNING capacitor C 124 for a "dip" (minimum reading) on the test set meter.

(5) When the meter has been "dipped", place the HI-LO power switch on the power supply in the HI position.

g. Adjustment, Output Circuits for 10 Watt Transmitter

(1) Adjust the PA plate circuit to the RF LOAD by turning the ANT TRIMMER capacitor C 125 until a maximum reading has been obtained on the test set meter.

(2) Couple the RF plate circuit to the RF wattmeter or dummy load.

CAUTION

When making the following adjustments, do not exceed 125 milliamperes plate current (25 ua on test set).

(a) Using RF Wattmeter

1. Couple the PA plate circuit for desired RF output by turning the COUPLING adjustment counterclockwise until the transmitter



is loaded to the desired RF power output as indicated on the RF wattmeter.

NOTE

FCC regulations state: The power which may be used by a station shall be no more than the minimum required for satisfactory technical operation commensurate with the size of the area to be served and local conditions which affect radio transmission and reception.

Example: Federal Register, Volume 14, Number 87, Page 23, Paragraph 10.106.

2. Readjust the ANT TRIMMER capacitor C 125 for a maximum reading on the RF wattmeter.

(b) Using Dummy Antenna Load Lamp

1. Turn the COUPLING adjustment counterclockwise until a maximum brightness has been obtained.

2. Readjust the ANT TRIMMER capacitor C 125 for a maximum reading on the alignment meter.

(3) Load the Antenna

(a) Connect the antenna to be used in normal operation of the station to the antenna connector on the transmitter chassis.

(b) Turn the COUPLING adjustment counterclockwise to increase the coupling and tune the PA TUNING capacitor C 124 through resonance--resonance is indicated by a "dip" in the meter reading.

(c) Gradually increase the coupling to a point where only a slight "dip" is noticeable when tuning through resonance. This will indicate the point of maximum output. DO NOT exceed 125 milliamperes plate current (25 microamperes reading on test set).

NOTE

Care should be taken not to overcouple the transmitter to the antenna as the plate current "dip" will disappear and actual power output will be below the maximum value. Also, a false dip may occur which will not be coincident with maximum radiation.

To ascertain the exact point for maximum power output and best efficiency, a field strength meter or RF wattmeter should be used as described in the following paragraphs.

(d) A field strength meter may also be used if proper precautions are observed to insure that the meter receives a signal from the transmitter antenna and that no spurious radiations from any other radio equipment are present.

(e) When a field strength meter or the P-8501-A Test Set (as a field strength meter) is used, the transmitter must be inside the housing to avoid stray radiation. Allow only an opening sufficient to permit tuning of the COUPLING and ANT TRIMMER controls. The antenna must be connected to the transmitter and stray radiations from approximate sources should be avoided. Adjust ANT TRIMMER C 125 and the ANT COUPLING control for a maximum indication on the field strength meter. The plate current must not exceed 125 milliamperes (25 microamperes reading on the test set).

(4) PA Loading

In general, a plate current reading of 100 ma (20 microamperes on the P-8501-A Test Set Meter) should be sufficient to provide rated power output. For maximum tube life, it is recommended that the output be coupled, just sufficiently to provide dependable communication within the desired range. In any event, the PA should not exceed 125 milliamperes (25 microamperes on the test set). The final amplifier plate current for rated power output for a given unit is included in the final test data sheet shipped with the equipment. This reading may be used as a criterion of power output when re-aligning the transmitter.

(5) Final Adjustments

(a) With the transmitter turned "on", repeak T 1, T 2, L 106, L 107, C 119 and C 121 as outlined in the ROUTINE MAINTENANCE ALIGNMENT CHART.

(b) Tighten the locknuts on the PA TUNING.

(6) Meter Readings After Final Adjustments For 10 Watt Transmitter

The values listed in the following table are relative and will vary with each unit. However, the readings provide a good indication of proper operation when compared with normal values previously recorded or supplied by the factory. The

readings specified are obtained with a MOTOROLA P-8501-A Test Set.

(a) All readings except the PA are MINIMUM readings required for proper operation of the transmitter. The PA reading is the MAXIMUM value of plate current to which the unit may be safely tuned. DO NOT exceed this reading.

TA139A Series Transmitters (10 Watts)

SWITCH POSITION	1	2	3	-4	5	6	7	8	PA (+4)
METER SCALE READING	-	-	13	8	16	11	17	*	±25

(b) Readings #1 thru #6 are purely relative and will not constitute the actual current or voltage conditions of the circuits being measured.

(c) Position 7 provides an indication of transmitter B+ voltage. In this application, the P-8501-A Test Set becomes a voltmeter with a full scale deflection of 1000 volts. For a voltage reading, multiply the ua scale reading by 20 and calibrate in volts. Example: Scale reading of 17 ua equals a true reading of 340 volts.

*(d) Position 8 reads, DC relay control voltage when transmitter is not being keyed and zero (0) when the transmitter is being keyed. To obtain actual voltage, multiply the meter reading of the P-8501-A Test Set by 0.3 and calibrate in volts.

†(e) To obtain actual PA plate current, multiply the meter reading of the P-8501-A Test Set by 5 and calibrate in milliamperes. Example: Scale reading of 25 ua equals a true current reading of 125 ma.

h. Adjustment, Output Circuits for 25 Watt Transmitter

(1) Adjust the PA plate circuit coupling to the RF LOAD by turning the ANT TRIMMER capacitor C 125 until a maximum reading has been obtained on the test set meter.

(2) Couple the RF plate circuit to the RF wattmeter or dummy load.

CAUTION

When making the following adjustments, do not exceed 150 milliamperes plate current (30 ua on test set).

(a) Using RF Wattmeter

1. Couple the PA plate circuit for desired RF output by turning the COUPLING adjustment counterclockwise until the transmitter is loaded to the desired RF power output as indicated on the RF wattmeter.

NOTE

F.C.C. regulations state: The power which may be used by a station shall be no more than the minimum required for satisfactory technical operation commensurate with the size of the area to be served and local conditions which affect radio transmission and reception.

Example: Federal Register, Volume 14, Number 87, Page 23 Paragraph 10.106.

2. Readjust the ANT TRIMMER capacitor C 125 for a maximum reading on the RF wattmeter.

(b) Using Dummy Antenna Load Lamp

1. Turn the COUPLING adjustment counterclockwise until a maximum brightness has been obtained.

2. Readjust the ANT TRIMMER capacitor C 125 for a maximum reading on the alignment meter.

(3) Load the Antenna

(a) Connect the antenna to be used in normal operation of the station to the antenna connector on the transmitter chassis.

(b) Turn the COUPLING adjustment counterclockwise to increase the coupling and tune the PA TUNING capacitor C 124 through resonance---resonance is indicated by a "dip" in the meter reading.

(c) Gradually increase the coupling to a point where only a slight "dip" is noticeable when tuning through resonance. This will indicate the point of maximum output.

(d) DO NOT exceed 150 milliamperes plate current (30 microamperes readings on test set).

NOTE

Care should be taken not to overcouple the transmitter to the antenna as the

plate current "dip" will disappear and actual power output will be below the maximum value. Also, a false dip may occur which will not be coincident with maximum radiation.

To ascertain the correct point for maximum power output and best efficiency, an RF wattmeter should be used as described in the preceeding paragraph.

(e) A field strength meter may also be used if proper precautions are observed to insure that the meter receives a signal from the transmitter antenna and no spurious radiations from any other radio equipment are present.

(f) When a field strength meter or the P-8501-A Test Set (as a field strength meter) is used, the transmitter must be inside the housing to avoid stray radiation. Allow only an opening sufficient to permit tuning of the output COUPLING and ANT TRIMMER controls. The antenna must be connected to the transmitter. Radiation from other transmitters must be avoided. Adjust the ANT TRIMMER capacitor and COUPLING for a maximum indication on the field strength meter. The plate current must not exceed 150 milliamperes.

(4) PA Loading

In general, a plate current reading of 145 ma (29 microamperes on the P-8501-A Test Set Meter) should be sufficient to provide rated power output. For maximum tube life, it is recommended that the output be coupled, just sufficiently to provide dependable communication within the desired range. In any event, the PA should not exceed 150 milliamperes (30 microamperes). The final amplifier plate current for rated power output for a given unit is included on the final test data sheet shipped with the equipment. This reading may be used as a criterion of power output when re-aligning the transmitter.

(5) Final Adjustments

(a) With the transmitter turned "on" repeat T 1, T 2, L 106, L 107, C 119 and C 121. Refer to ROUTINE MAINTENANCE ALIGNMENT CHART.

(b) Tighten the locknuts on the PA TUNING.

(6) Meter Readings After Final Adjustments For 25 Watt Transmitter

The values listed in the following table are relative and will vary with each unit. However, the readings provide a good indication of proper operation when compared with normal values previously recorded or supplied by the factory. The readings specified are obtained with a MOTOROLA P-8501-A Test Set.

(a) All readings except the PA are MINIMUM readings required for proper operation of the transmitter. The PA reading is the MAXIMUM value of plate current to which the unit may be safely tuned. DO NOT exceed this reading.

TA139A Series Transmitters (25 Watts)

SWITCH POSITION	1	2	3	4	5	6	7	8	PA (+4)
METER SCALE READING	-	-	4	6	11	9	18	*	‡ 30

(b) Readings #1 thru #6 are purely relative and will not constitute the actual current or voltage conditions of the circuits being measured.

(c) Position 7 provides an indication of transmitter B+ voltage. In this application, the P-8501-A Test Set becomes a voltmeter with a full scale deflection of 1000 volts. For a voltage reading, multiply the ua scale reading by 20 and calibrate in volts. Example: Scale reading of 18 ua equals a true reading of 360 volts.

*(d) Position 8 reads, DC relay control voltage when transmitter is not being keyed and zero (0) when the transmitter is being keyed. To obtain actual voltage, multiply the meter reading of the P-8501-A Test Set by 0.3 and calibrate in volts.

‡(e) To obtain actual PA plate current, multiply the meter reading of the P-8501-A Test Set by 5 and calibrate in milliamperes. Example: Scale reading of 30 ua equals a true current reading of 150 ma.

6. AUDIO ADJUSTMENTS

a. I. D. C. "Instantaneous Deviation Control"

The adjustable I. D. C. circuit has been set for proper operation at the factory. No attempt should be made to change this adjustment control

unless a MOTOROLA F4MU-24B Series Station Monitor or equivalent is available to check modulation deviation.

In the event that readjustment of the I. D. C. circuit becomes necessary, the subsequent procedure should be followed:

(1) Set up a MOTOROLA F4MU-24B Series Station Monitor for VOICE MODULATION MEASUREMENT. Refer to the station monitor instruction manual for measurement instructions.

(2) Turn the monitored transmitter "on" and modulate with a 1000 cycle tone or a loud sustained oral sound (use the word Ahhhh--).

(3) Adjust the I. D. C. control (R 130) on the top of the transmitter chassis for proper modulation deviation.

(a) Adjacent and Alternate Channel Applications

When the transmitter is for operation on a 60 kc or 120 kc channel spacing, the I. D. C. control should be adjusted for an approximate 13 kc reading on the station monitor MODULATION DEVIATION METER. Note that the MODULATION DEVIATION METER will swing up to 15 kc on voice peaks.

NOTE

F.C.C. rules and regulations stipulate a maximum allowable modulation deviation of ± 15 kc for standard channel applications.

(b) Narrowed Channel Applications

When the transmitter is intended for operation on a 30 kc channel spacing, the I. D. C. control should be adjusted for a maximum MODULATION DEVIATION meter reading of 5 kc on voice peaks.

NOTE

F.C.C. rules and regulations stipulate a maximum allowable modulation deviation of ± 5 kc for narrowed channel applications.

b. Audio Sensitivity Adjustment

All transmitters described herein have a two level connection to the I. D. C. amplifier for modifying the basic audio sensitivity of the unit. Audio sensitivity variations are achieved by connecting

the input grid capacitor (C 123) lead to either of two points as shown on Schematic Diagram 63E839289. When a MOTOROLA military type microphone or equivalent is to be used with the transmitter, connect the grid capacitor lead to "POSITION 1" (0.25 volt sensitivity). For use with a telephone cradle type handset, connect the grid capacitor lead to "POSITION 2" (0.18 volt sensitivity).

7. REDUCED POWER OPERATION

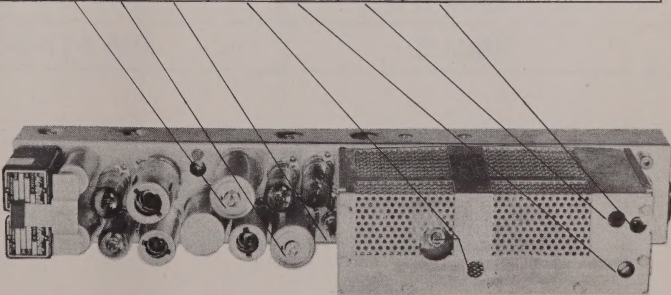
MOTOROLA TA139A Series Transmitters of a 25 watt model may be operated at reduced power

if desired. Such operation is accomplished by placing the HI-LO switch on the associated power supply chassis in the LO position. Under this condition, transmitter power output will be reduced to approximately one-half of its normal rated output.

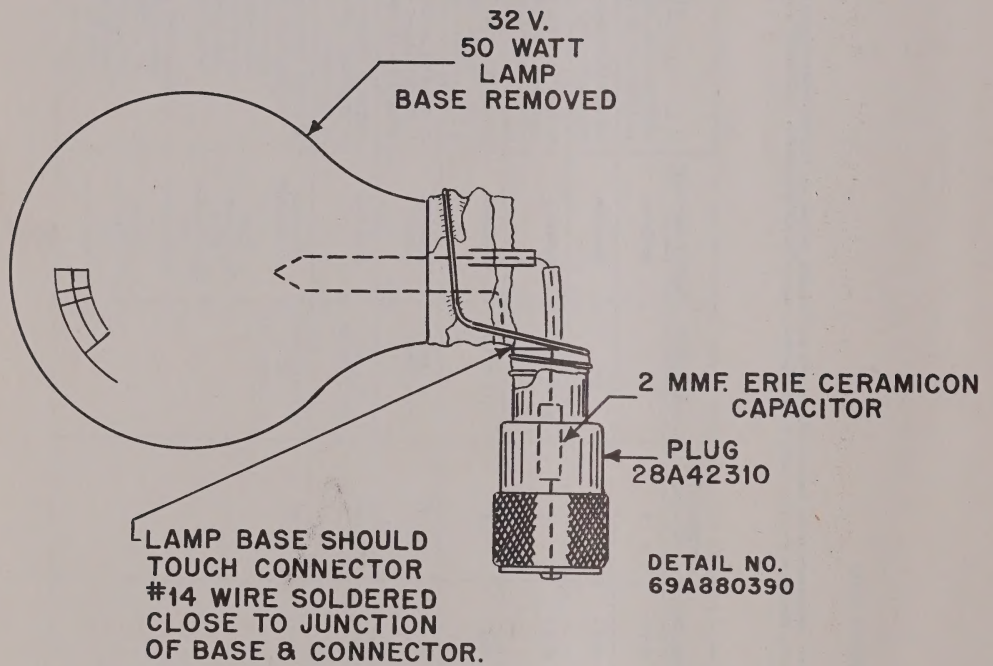
Reduced power operation may be acceptable for many applications where the added propagational advantages of high power operation is not required. Low power operation will afford extended life to the final tubes of the transmitter.

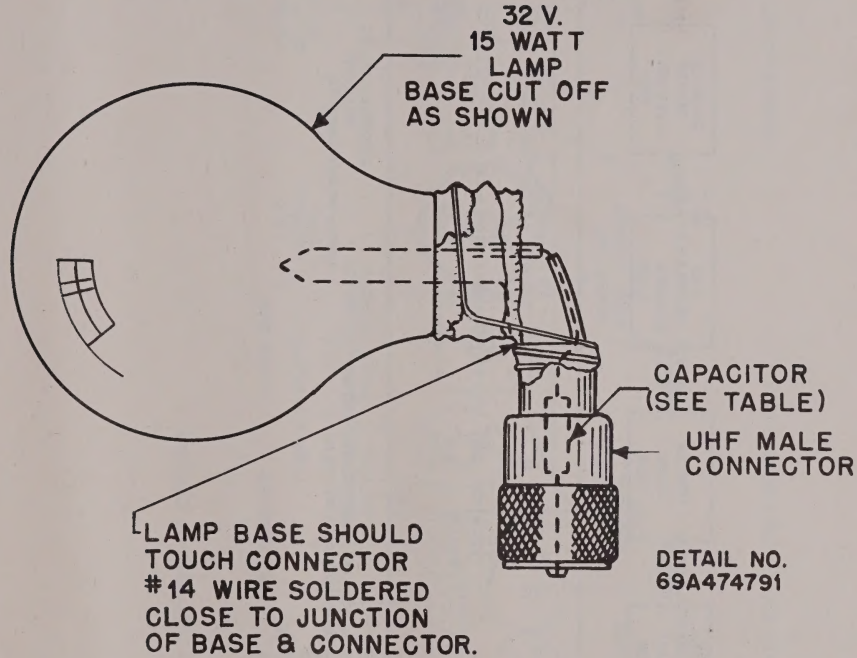
8. SIMPLIFIED ROUTINE MAINTENANCE ALIGNMENT CHART

After the serviceman becomes familiar with comprehensive maintenance adjustments for this unit, he may use this Simplified Routine Maintenance Alignment Procedure as an alignment check. He should not attempt to use the Simplified Procedure until he has followed complete COMPREHENSIVE ALIGNMENT procedure described earlier in this section.



SEQUENCE	METER SWITCH POSITION	ADJUSTMENT	METER READING	STAGE AND PROCEDURE
Step 1	3	T 1	Maximum	TRIPLER GRID: Adjust top slug. Test load connected to ANT receptacle and HI-LO Switch in LO position
Step 2	-4	T 2	Maximum	2nd DOUBLER GRID: Adjust top slug. Upon completion of adjustment, repeat T 1 with meter switch in position -4.
Step 3	5	L 106, L 107	Maximum	2nd DOUBLER PLATE - DOUBLER DRIVER GRID: Adjust L 106 then L 107. Upon completion of adjustments, repeat T 2 with meter switch in position 5.
Step 4	6	C 119, C 121	Maximum	DOUBLER DRIVER PLATE - PA GRID: Adjust C 119 then C 121. Upon completion of adjustments, repeat L 106 and L 107 with meter switch in position 6.
Step 5	PA (44)	C 124 (PA TUNING)	Minimum (DIP)	PA PLATE CIRCUIT: Adjustment to be made with ANT COUPLING control fully clockwise (decoupled) and ANT TRIMMER C 125 tuned min. plate current.
Step 6	PA (44)	C 125 (ANT TRIMMER)	Maximum	ANTENNA INPUT: Adjustment to be made with HI-LO switch in HI position. (Switch to remain in HI position for remainder of procedure).
Step 7	PA (44)	ANT COUPLING and C 124 or C 125	Maximum RF OUTPUT Note Do not exceed 150 ma. (30 ua Test Set) for 25 Watt Trans. or 125 ma (25 ua Test Set) for 10 Watt Trans.	ANTENNA COUPLING: - Using field strength meter--- Remove test load and connect antenna. Make adjustments with transmitter shielded as much as possible by housing. With RF probe of meter near transmitter antenna, adjust C 125 and ANT COUPLING for a maximum RF indication on meter. - Without field strength meter--- Remove test load and connect antenna. Gradually increase COUPLING (turn counterclockwise) while alternately retuning C 124 for resonance (dip). Increase coupling until only a slight dip is apparent. Recheck setting of C 125 for 150 ma. (25 watts) or 125 ma. (10 watts).

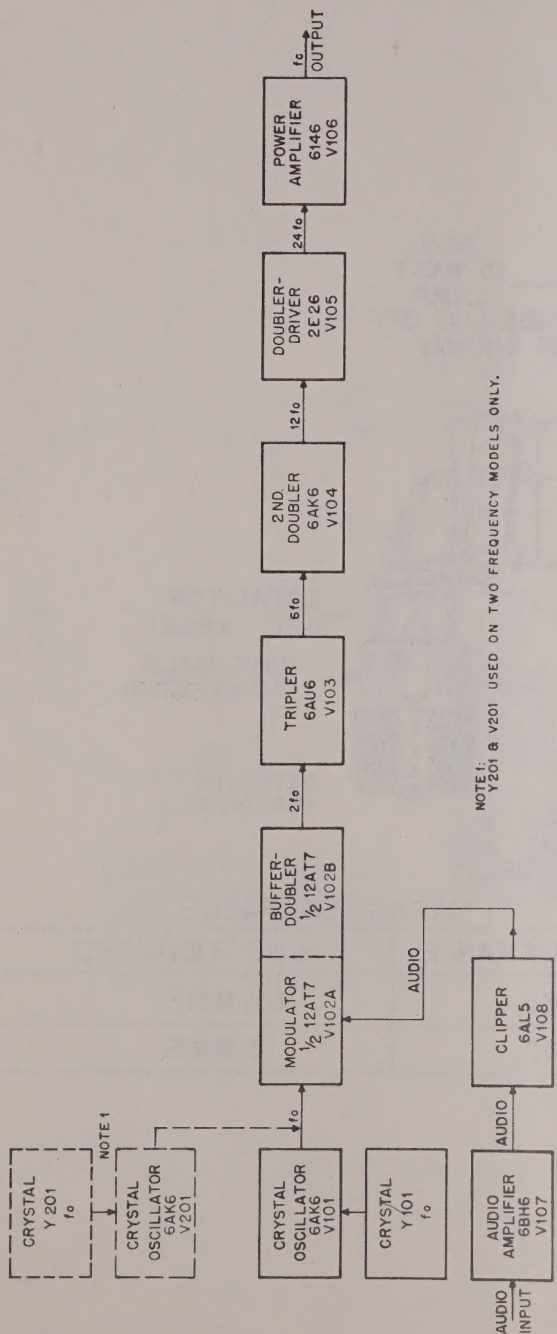




CAPACITOR TABLE

FREQUENCY RANGE	VALUE REQUIRED
25-50 MC.	40 MMF.
144-174 MC.	3 MMF.

144-174 MC. TRANSMITTER CHASSIS
BLOCK DIAGRAM



NOTE 1:
Y201 & V201 USED ON TWO FREQUENCY MODELS ONLY.

LEGEND—

f_o = OSCILLATOR FREQUENCY = 6,000 - 7,250 MC.

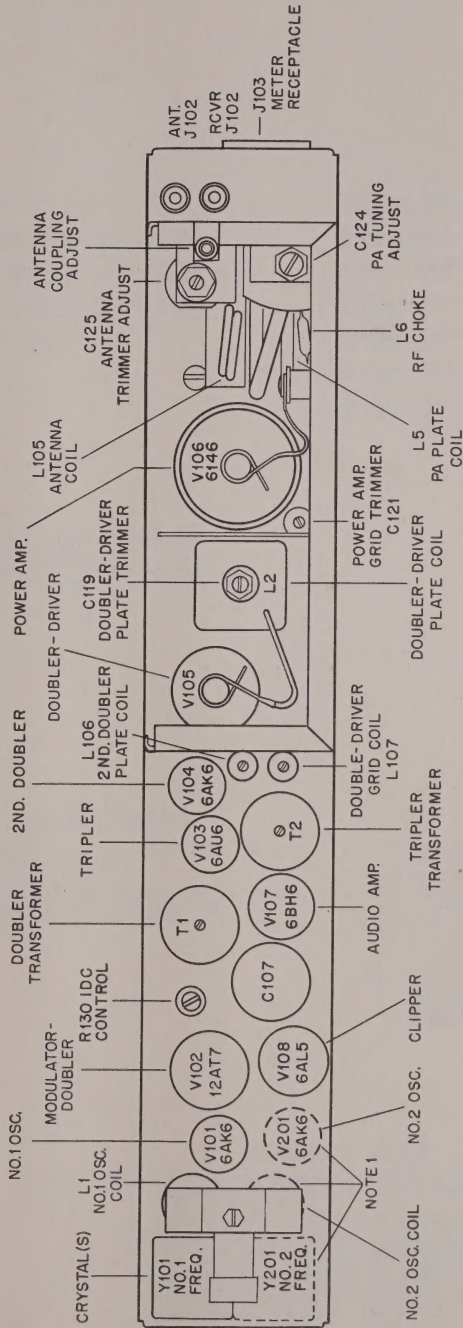
f_c = CARRIER FREQUENCY = 144 - 174 MC.

$f_o = \frac{f_c}{24}$

$f_c = 24 f_o$

DIAGRAM NO. 63C839335

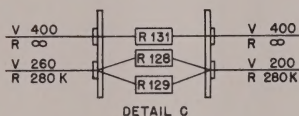
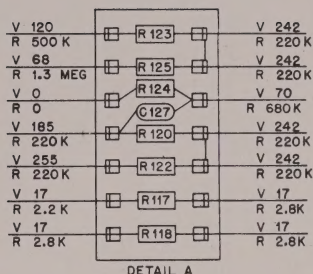
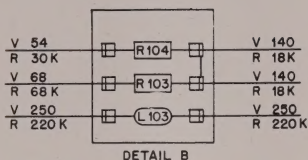
TOP VIEW OF CHASSIS



NOTE:

1. Y201, L201 & V201 ARE USED WITH 2 FREQUENCY MODELS ONLY.

DIAGRAM NO. 69C839336



VOLTAGE NOTES

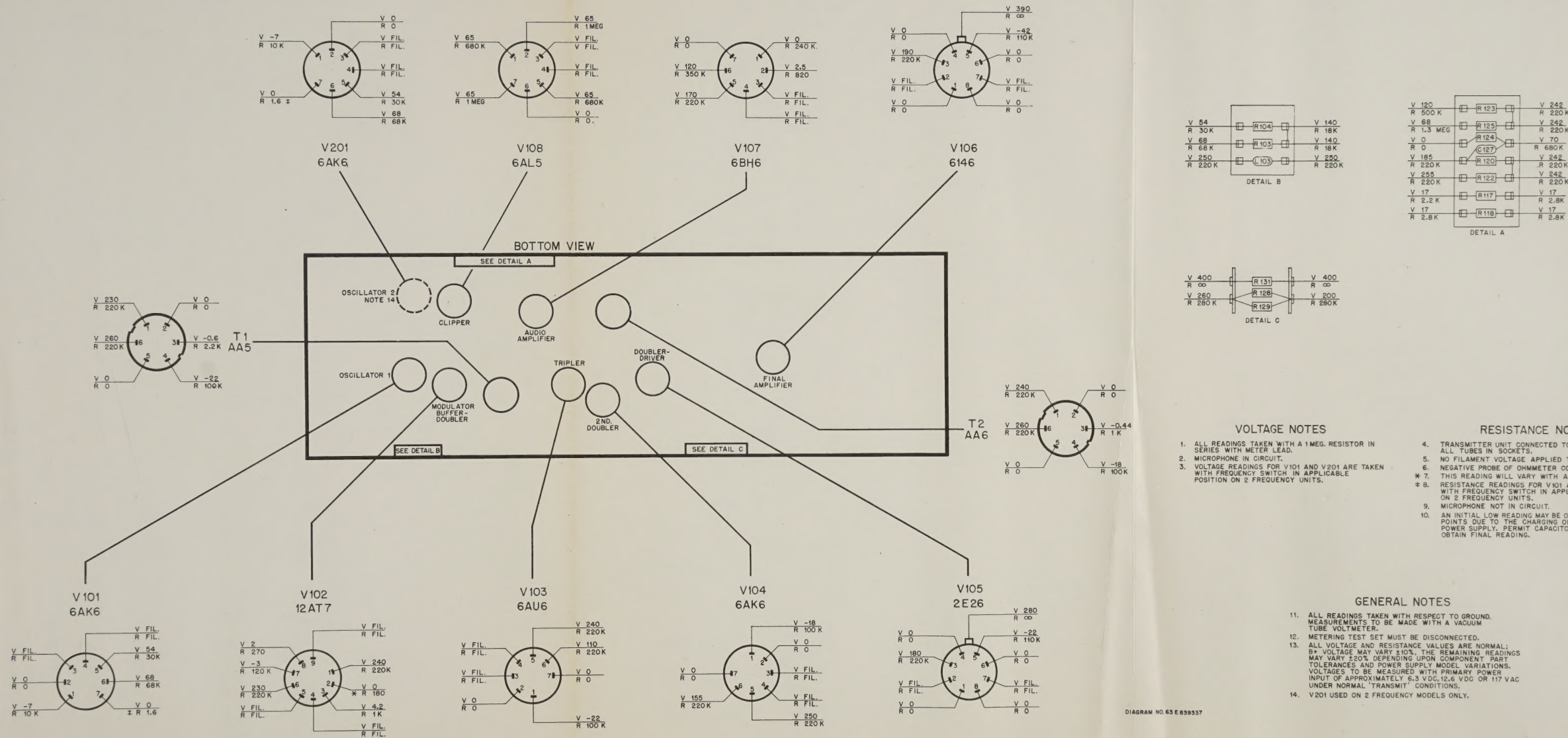
1. ALL READINGS TAKEN WITH A 1 MEG. RESISTOR IN SERIES WITH METER LEAD.
2. MICROPHONE IN CIRCUIT.
3. VOLTAGE READINGS FOR V101 AND V201 ARE TAKEN WITH FREQUENCY SWITCH IN APPLICABLE POSITION ON 2 FREQUENCY UNITS.

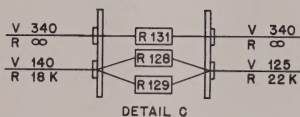
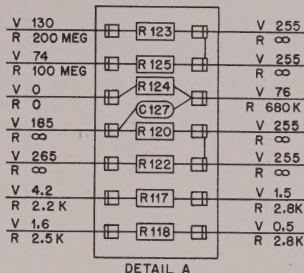
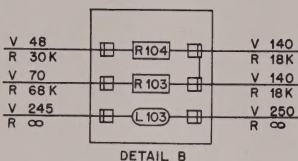
RESISTANCE NOTES

4. TRANSMITTER UNIT CONNECTED TO POWER SUPPLY. ALL TUBES IN SOCKETS.
5. NO FILAMENT VOLTAGE APPLIED TO UNIT.
6. NEGATIVE PROBE OF OHMMETER CONNECTED TO GROUND.
- * 7. THIS READING WILL VARY WITH ADJUSTMENT OF R130.
- * 8. RESISTANCE READINGS FOR V101 AND V201 ARE TAKEN WITH FREQUENCY SWITCH IN APPLICABLE POSITION ON 2 FREQUENCY UNITS.
9. MICROPHONE NOT IN CIRCUIT.
10. AN INITIAL LOW READING MAY BE OBTAINED AT MANY POINTS DUE TO THE CHARGING OF CAPACITORS IN THE POWER SUPPLY. PERMIT CAPACITORS TO CHARGE TO OBTAIN FINAL READING.

GENERAL NOTES

11. ALL READINGS TAKEN WITH RESPECT TO GROUND. MEASUREMENTS TO BE MADE WITH A VACUUM TUBE VOLTMETER.
12. METERING TEST SET MUST BE DISCONNECTED.
13. ALL VOLTAGE AND RESISTANCE VALUES ARE NORMAL; B+ VOLTAGE MAY VARY $\pm 10\%$, THE REMAINING READINGS MAY VARY $\pm 20\%$ DEPENDING UPON COMPONENT PART TOLERANCES AND POWER SUPPLY MODEL VARIATIONS. VOLTAGES TO BE MEASURED WITH PRIMARY POWER INPUT OF APPROXIMATELY 6.3 VDC, 12.6 VDC OR 117 VAC UNDER NORMAL 'TRANSMIT' CONDITIONS.
14. V201 USED ON 2 FREQUENCY MODELS ONLY.





VOLTAGE NOTES

1. ALL READINGS TAKEN WITH A 1MEG. RESISTOR IN SERIES WITH METER LEAD.
2. MICROPHONE IN CIRCUIT.
3. VOLTAGE READINGS FOR V101 AND V201 ARE TAKEN WITH FREQUENCY SWITCH IN APPLICABLE POSITION ON 2 FREQUENCY UNITS.

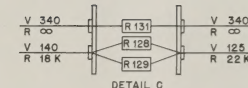
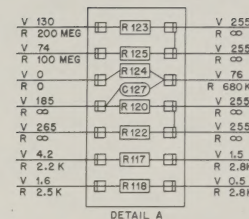
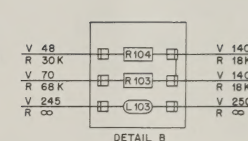
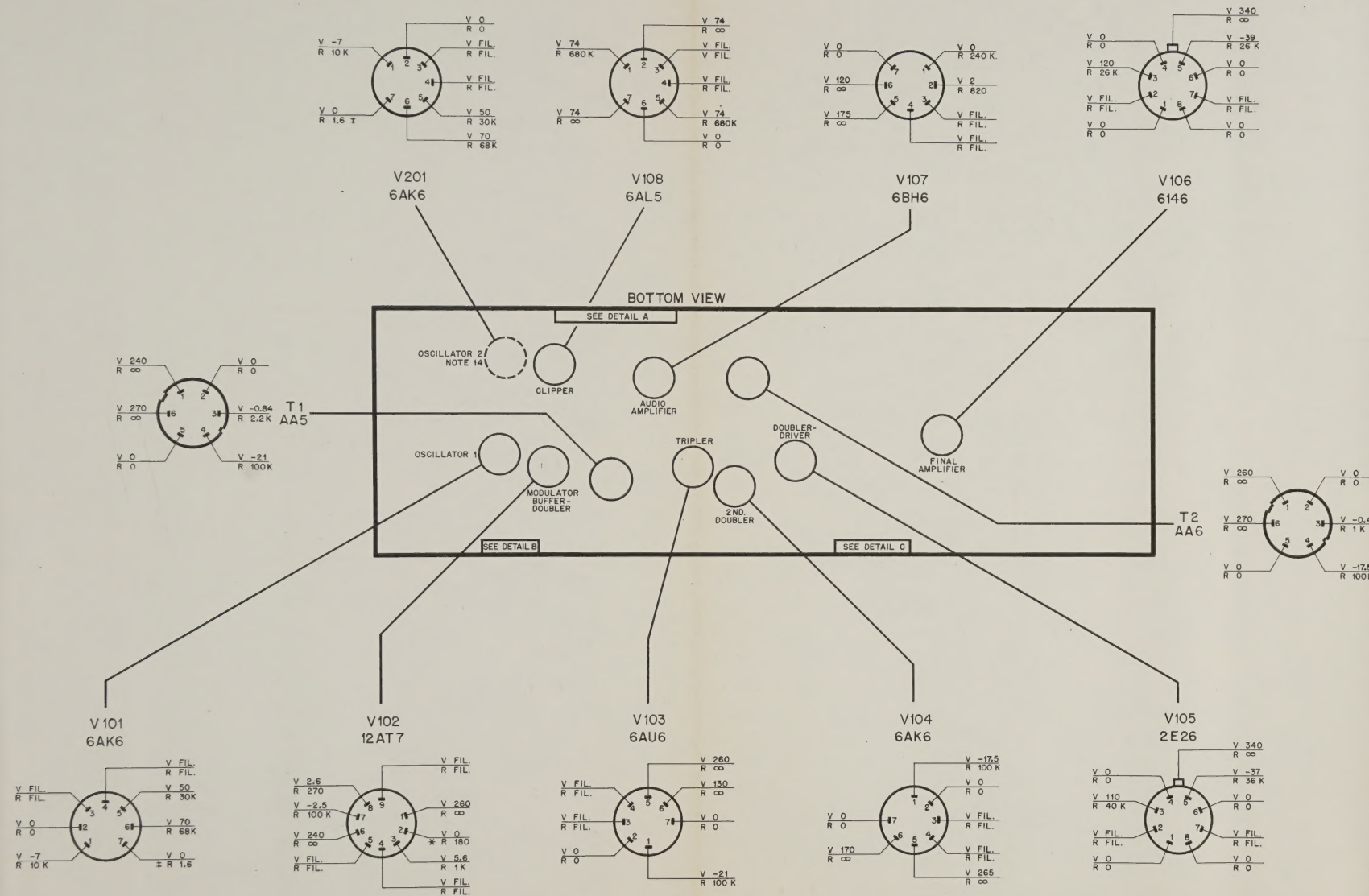
RESISTANCE NOTES

4. TRANSMITTER UNIT CONNECTED TO POWER SUPPLY. ALL TUBES IN SOCKETS.
5. NO FILAMENT VOLTAGE APPLIED TO UNIT.
6. NEGATIVE PROBE OF OHMMETER CONNECTED TO GROUND.
- * 7. THIS READING WILL VARY WITH ADJUSTMENT OF R130.
- # 8. RESISTANCE READINGS FOR V101 AND V201 ARE TAKEN WITH FREQUENCY SWITCH IN APPLICABLE POSITION ON 2 FREQUENCY UNITS.
9. MICROPHONE NOT IN CIRCUIT.
10. AN INITIAL LOW READING MAY BE OBTAINED AT MANY POINTS DUE TO THE CHARGING OF CAPACITORS IN THE POWER SUPPLY. PERMIT CAPACITORS TO CHARGE TO OBTAIN FINAL READING.

GENERAL NOTES

11. ALL READINGS TAKEN WITH RESPECT TO GROUND. MEASUREMENTS TO BE MADE WITH A VACUUM TUBE VOLTMETER.
12. METERING TEST SET MUST BE DISCONNECTED.
13. ALL VOLTAGE AND RESISTANCE VALUES ARE NORMAL; B+ VOLTAGE MAY VARY $\pm 10\%$, THE REMAINING READINGS MAY VARY $\pm 20\%$ DEPENDING UPON COMPONENT PART TOLERANCES AND POWER SUPPLY MODEL VARIATIONS. VOLTAGES TO BE MEASURED WITH PRIMARY POWER INPUT OF APPROXIMATELY 6.3 VDC, 12.6 VDC OR 117 VAC UNDER NORMAL 'TRANSMIT' CONDITIONS.
14. V201 USED ON 2 FREQUENCY MODELS ONLY.

GRAM NO. 63 E839339



VOLTAGE NOTES

1. ALL READINGS TAKEN WITH A 1 MEG. RESISTOR IN SERIES WITH METER LEAD.
2. MICROPHONE IN CIRCUIT.
3. VOLTAGE READINGS FOR V101 AND V201 ARE TAKEN WITH FREQUENCY SWITCH IN APPLICABLE POSITION ON 2 FREQUENCY UNITS.

RESISTANCE NOTES

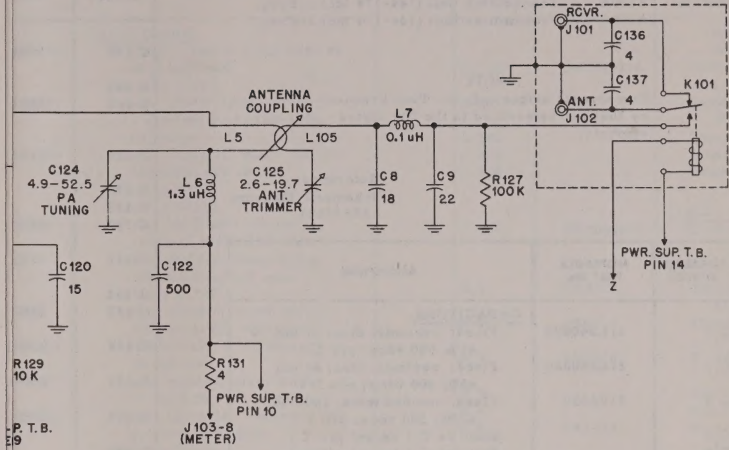
4. TRANSMITTER UNIT CONNECTED TO POWER SUPPLY. ALL TUBES IN SOCKETS.
5. NO FILAMENT VOLTAGE APPLIED TO UNIT.
6. NEGATIVE PROBE OF OHMMETER CONNECTED TO GROUND.
- * 7. THIS READING WILL VARY WITH ADJUSTMENT OF R130.
- * 8. RESISTANCE READINGS FOR V101 AND V201 ARE TAKEN WITH FREQUENCY SWITCH IN APPLICABLE POSITION ON 2 FREQUENCY UNITS.
9. MICROPHONE NOT IN CIRCUIT.
10. AN INITIAL LOW READING MAY BE OBTAINED AT MANY POINTS DUE TO THE CHARGING OF CAPACITORS IN THE POWER SUPPLY. PERMIT CAPACITORS TO CHARGE TO OBTAIN FINAL READING.

GENERAL NOTES

11. ALL READINGS TAKEN WITH RESPECT TO GROUND. MEASUREMENTS TO BE MADE WITH A VACUUM TUBE VOLTMETER.
12. METERING TEST SET MUST BE DISCONNECTED.
13. ALL VOLTAGE AND RESISTANCE VALUES ARE NORMAL; 8+ VOLTAGE MAY VARY ±10%. THE REMAINING READINGS MAY VARY ±20% DEPENDING UPON COMPONENT PART TOLERANCES AND POWER SUPPLY MODEL VARIATIONS. VOLTAGES TO BE MEASURED WITH PRIMARY POWER INPUT OF APPROXIMATELY 6.3 VDC; 12.6 VDC OR 117 VAC UNDER NORMAL "TRANSMIT" CONDITIONS.
14. V201 USED ON 2 FREQUENCY MODELS ONLY.

DIAGRAM NO. 63 E 939339

144-174 MC. TRANSMITTER SCHEMATIC DIAGRAM

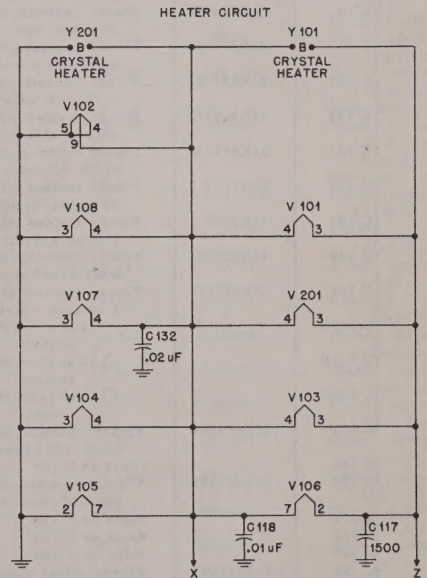


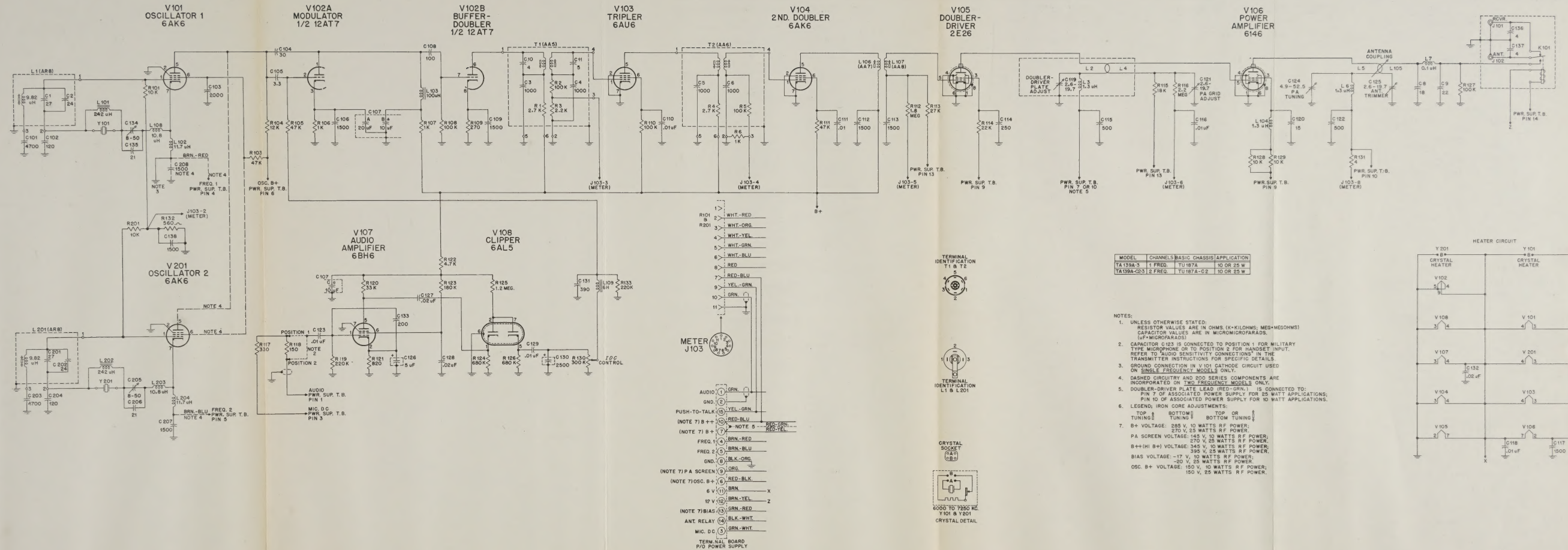
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29

MEGOHMS)

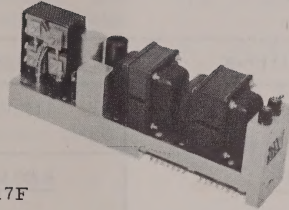
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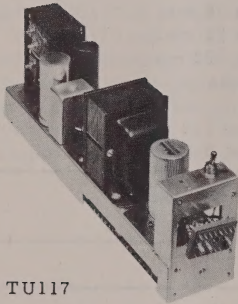




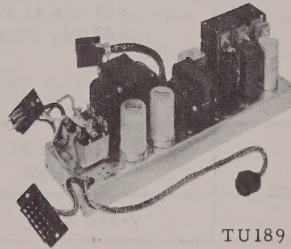
POWER SUPPLY CHASSIS



TU117F



TU117



TU189

MODEL	PRIMARY POWER SOURCE	APPLICATION
TU117	6.3 VDC or 12.6 VDC	Single- or two-frequency, 25-30 watt, trunk mounting mobile stations.
TU117-F	6.3 VDC or 12.6 VDC	Single- or two-frequency, 25-30 watt, front mounting mobile stations.
TU189	117 VAC	Single- or two-frequency, 25-30 watt, AC Utility Stations.

MOTOROLA Communications and Electronics Division

Engineering Publications 4501 W. Augusta Blvd. Chicago 51, Illinois

SCHEMATIC DIAGRAM PARTS LIST

Models: TA139A Transmitter Unit (144-174 Mc) 1-Freq.
TA139A-C2 Transmitter Unit (144-174 Mc) 2-Freq.

NOTE

Components unique only for Two-Frequency Unit are referenced in the 200 series symbols.

Reference:
Schematic Diagram
63E839289

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITORS,
C 1	21K840895	Fixed: ceramic; disc; 27 uuf ±5%; 500 vdcw; p/o L 1
C 2	21K840845	Fixed: ceramic; disc; 24 uuf ±5%; 500 vdcw; p/o L 1
C 3	21K6638	Fixed: molded mica; 1000 uuf ±20%; 500 vdcw; p/o T 1
C 4		Same as C 3 except p/o T 1
C 5		Same as C 3 except p/o T 2
C 6		Same as C 3 except p/o T 2
C 7		NOT USED
C 8	21R890046	Fixed: ceramic; tubular; 18 uuf ±5%; 500 vdcw
C 9	21R118628	Fixed: ceramic; tubular; 22 uuf ±10%; 500 vdcw
C 10	21K474952	Fixed: ceramic; tubular; 4 uuf ±0.5 uuf; 500 vdcw; p/o T 1
C 11	21R87130	Fixed: ceramic; tubular; 5 uuf ±0.5 uuf; 500 vdcw; p/o T 1
C 101	21K837747	Fixed: ceramic; disc; 4700 uuf ±10%; 500 vdcw
C 102	21K840713	Fixed: molded silver mica; 120 uuf ±5%; 500 vdcw
C 103	21K837746	Fixed: ceramic; disc; 2000 uuf ±10%; 500 vdcw
C 104	21K2733	Fixed: molded silver mica; 30 uuf ±10%; 500 vdcw
C 105	21K2753	Fixed: molded silver mica; 3.3 uuf ±.5 uuf; 500 vdcw
C 106	21B800801	Fixed: ceramic; disc; 1500 uuf GMV ±100% max; 500 vdcw
C 107	23K892117	Fixed: electrolytic; tubular; 3 section; consisting of: 20 uuf +50-10%; 450 vdcw; section
C 107A		△ 10 uuf +50-10%; 450 vdcw; section
C 107B		□ 10 uuf +100-10%; 25 vdcw; section
C 107C		
C 108	21K474009	Fixed: ceramic; tubular; 100 uuf ±20%; 500 vdcw
C 109		Same as C 106
C 110	21A801139	Fixed: ceramic; disc; .01 uuf +80-20%; 600 vdcw
C 111		Same as C 110
C 112		Same as C 106
C 113		Same as C 106
C 114	21A112247	Fixed: silver mica; 250 uuf ±10%
C 115	21A824948	Fixed: silver mica; 500 uuf +20-10%; 600 vdcw
C 116		Same as C 110
C 117		Same as C 106
C 118		Same as C 110
C 119	19K800032	Variable: air; 2.6 uuf min. to 19.7 uuf max.; p/o L 2
C 120	21K835358	Fixed: molded silver mica; 15 uuf ±10%; 500 vdcw
C 121		Same as C 119
C 122		Same as C 115
C 123		Same as C 110

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITORS,
C 124	19B838179	Variable: air; 4.9 uuf min. to 52.5 uuf max.
C 125		Same as C 119
C 126	23K890624	Fixed: electrolytic; tubular; 1 section; 5 uuf ±100-15%; 150 vdcw
C 127	21B401029	Fixed: ceramic; disc; .02 uuf +80-20%; 600 vdcw
C 128		Same as C 127
C 129		Same as C 110
C 130	8K836753	Fixed: oil filled; tubular; .0025 uuf ±10%; 100 vdcw
C 131	21K6720	Fixed: molded silver mica; 390 uuf ±5%; 500 vdcw
C 132		Same as C 127
C 133	21K2748	Fixed: molded silver mica; 200 uuf ±10%; 500 vdcw
C 134	20B840719	Variable: air; 8 uuf min. to 50 uuf max.
C 135	21K848272	Fixed: molded silver mica; 21 uuf ±2%; 300 vdcw
C 136	21K474952	Fixed: ceramic; tubular; 4 uuf ±.5 uuf; 500 vdcw
C 137		Same as C 136
C 138		Same as C 106
C 201		Same as C 1
C 202		Same as C 2
C 203		Same as C 101
C 204		Same as C 102
C 205		Same as C 134
C 206		Same as C 135
C 207		Same as C 106
C 208		Same as C 106
		CONNECTORS,
J 101	9A87120	Receptacle; female; single contact; round molded mica filled base; chassis mounted
J 102		Same as J 101
J 103	9B880881	Receptacle; female; 11 contact; polarized; round molded black phenolic base; saddle mounting
		RELAY,
K 101	59K842298	Armature: 6 VDC; non-coaxial; contact arrangement, 1 form "C"
		COILS, RF:
L 1	24B840777	Oscillator Warming: base stamped AR8; includes 46K891111 CORE, adjustable tuning; coded LAVENDER dot
L 2	1V835418	Driver RF Plate
L 3	24A891063	Choke; 1.3 microhenries; coded BLU dot; p/o L 2
L 4	1V840771	Final RF Grid
L 5	1V835421	Final RF Plate
L 6		Same as L 3 except p/o L 5
L 7	24A801714	Filter: 0.1 microhenries
L 101	24A835157	Choke: 242 microhenries; coded BRN dot; Neutralizing
L 102	24B840775	Choke: 11.7 microhenries; coded BLK-WHT dot; Oscillator
L 103	24A832402	Choke: 100 microhenries; coded BLU dot; Modulator
L 104		Same as L 3 except p/o Basic Chassis
L 105	24A834771	Antenna Pick-up Loop
L 106	24B835395	2nd Doubler Plate: base stamped AA7; includes 1V835422 CORE, adjustable tuning; and clip; coded BLUE dot
L 107	24K835396	2nd Doubler Grid: base stamped AA8; includes 1V835422 CORE,

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		adjustable tuning; and clip; coded BLUE dot
L 108	24K840776	Choke: 10.8 microhenries; coded YEL-GRN dot
L 201		Same as L 1 except 2nd Oscillator Warming
L 202		Same as L 101
L 203		Same as L 108
L 204		Same as L 102
		COILS, AF:
L 109	25D844032	Choke; 6 henries
		RESISTORS,
R 1	6R5577	Fixed: carbon; 2.7K ±10%; 1/2 w; ins; p/o T 1
R 2	6R6031	Fixed: carbon; 100K ±10%; 1/2 w; ins; p/o T 1
R 3	6R2028	Fixed: carbon; 2.2K ±5%; 1/2 w; ins; p/o T 1
R 4		Same as R 1 except p/o T 2
R 5		Same as R 2 except p/o T 2
R 6	6R6411	Fixed: carbon; 1K ±5%; 1/2 w; ins; p/o T 2
R 101	6R6320	Fixed: carbon; 10K ±10%; 1/2 w; ins.
R 102		NOT USED
R 103	6R6048	Fixed: carbon; 47K ±10%; 1/2 w; ins.
R 104	6R5656	Fixed: carbon; 12K ±10%; 1 w; ins.
R 105		Same as R 103
R 106	6R6411	Fixed: carbon; 1K ±5%; 1/2 w; ins.
R 107	6R6229	Fixed: carbon; 1K ±10%; 1/2 w; ins.
R 108		Same as R 2
R 109	6R6432	Fixed: carbon; 270 ohm ±10%; 1/2 w; ins.
R 110		Same as R 2
R 111		Same as R 103
R 112	6R401017	Fixed: carbon; 1.8 megohm ±5%; 1/2 w; ins.
R 113	6R6434	Fixed: carbon; 27K ±10%; 1/2 w; ins.
R 114	6R6341	Fixed: carbon; 22K ±10%; 1 w; ins.
R 115	6R5591	Fixed: carbon; 18K ±10%; 1/2 w; ins.
R 116	6R2073	Fixed: carbon; 2.2 megohm ±5%; 1/2 w; ins.
R 117	6R120638	Fixed: carbon; 330 ohm ±5%; 1/2 w; ins.
R 118	6R5645	Fixed: carbon; 150 ohm ±5%; 1/2 w; ins.
R 119	6R6407	Fixed: carbon; 220K ±10%; 1/2 w; ins.
R 120	6R2068	Fixed: carbon; 33K ±5%; 1/2 w; ins.
R 121	6R6269	Fixed: carbon; 820 ohm ±10%; 1/2 w; ins.
R 122	6R6080	Fixed: carbon; 4.7K ±10%; 1/2 w; ins.
R 123	6R2061	Fixed: carbon; 180K ±5%; 1/2 w; ins.
R 124	6R6475	Fixed: carbon; 680K ±10%; 1/2 w; ins.
R 125	6R5779	Fixed: carbon; 1.2 megohm ±10%; 1/2 w; ins.
R 126		Same as R 124
R 127		Same as R 2
R 128	6R6299	Fixed: carbon; 10K ±10%; 2 w; ins.
R 129		Same as R 128
R 130	18K812998	Variable: carbon; 300K ±20%; 1/4 w.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
R 131	17K892469	Fixed: wire wound; 4 ohm ±2%; 1 w; ins.
	or 17B821901	Fixed: wire wound; 4 ohm ±2%; 3 w; ins.
R 132	6R400058	Fixed: carbon; 560 ohm ±5%; 1/2 w; ins.
R 133		Same as R 119
R 201		Same as R 101
		TRANSFORMERS, RF:
T 1	24B835397	1st Doubler; base stamped AA5; includes: 1V87207 CORE, adjustable tuning; and palnut
T 2	24K835417	1V87208 CORE, adjustable tuning; and clip
		Tripler; base stamped AA6; includes: 1V87207 CORE, adjustable tuning; and palnut
		1V87208 CORE, adjustable tuning; and clip
		TUBES,
V 101	6AK6	Electron
V 102	12AT7	Electron
V 103	6AU6	Electron
V 104		Same as V 101
V 105	2E26	Electron
V 106	6146	Electron
V 107	6BH6	Electron
V 108	6AL5	Electron
V 201		Same as V 101
		SOCKETS,
XV 101	9K87124	Tube: female; 7 contact; miniature; molded mica filled phenolic base; includes center shield; saddle mounting
XV 102	9B881243	Tube: female; 9 contact; miniature; molded mica filled phenolic base; includes center shield and tube shield base; saddle mounting
XV 103		Same as XV 101
XV 104		Same as XV 101
XV 105	9B890001	Tube: female; 8 contact; brown bakelite wafer base; saddle mounting
XV 106		Same as XV 105
XV 107	9B834083	Tube: female; 7 contact; miniature; molded mica filled phenolic base; includes center shield and tube shield base; saddle mounting
XV 108		Same as XV 107
XY 201		Same as XV 101
XY 101	9A30451	Crystal: female; 4 contact; square molded mica filled bakelite base; chassis mounted
XY 201		Same as XY 101

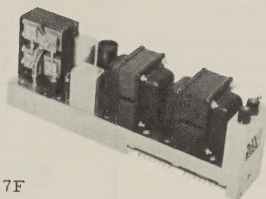
Crystals

NOTE

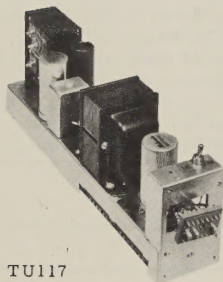
CRYSTAL UNITS are not part of the Transmitter Unit, but are part of overall model, and must be ordered separately.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
Y 101	1U835627	CRYSTAL UNITS, Quartz: Trans. Osc. 1250 - 16000 kc MOTOROLA Type DS1; when ordering frequency must be specified
Y 201		Same as Y 101 except used only for two-frequency operation

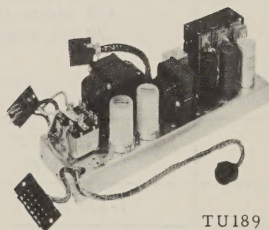
POWER SUPPLY CHASSIS



TU117F



TU117



TU189

MODEL	PRIMARY POWER SOURCE	APPLICATION
TU117	6.3 VDC or 12.6 VDC	Single- or two-frequency, 25-30 watt, trunk mounting mobile stations.
TU117-F	6.3 VDC or 12.6 VDC	Single- or two-frequency, 25-30 watt, front mounting mobile stations.
TU189	117 VAC	Single- or two-frequency, 25-30 watt, AC Utility Stations.

MOTOROLA Communications and Electronics Division

Engineering Publications 4501 W. Augusta Blvd. Chicago 51, Illinois

NOMINAL PERFORMANCE SPECIFICATIONS

BASIC UNITS	TU117, TU117-F	TU189
PRIMARY POWER SOURCE	6.3 VDC or 12.6 VDC	117 VAC
VOLTAGE RATINGS	<u>RECEIVER:</u> 190 vdc at 70 ma. <u>TRANSMITTER:</u> 150 vdc at 18 ma. 275 vdc at 55 ma. 425 vdc at 123 ma. -20 vdc Bias	<u>RECEIVER:</u> 190 vdc at 70 ma. <u>TRANSMITTER:</u> 150 vdc at 18 ma. 275 vdc at 55 ma. 425 vdc at 123 ma. -20 vdc Bias 6.3 VAC at 7.0 Amp. 6.0 VDC at 0.5 Amp.
DIMENSIONS	15" long x 3" wide x 5-1/4" high	15" long x 3" wide x 5-1/4" high
WEIGHT	9-1/2 lbs.	14 lbs.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

DESCRIPTION

To provide maximum flexibility, the power supplies intended for universal mobile installations are designed for operation from either a 6 or 12 VDC primary power source. The Models TU117 and TU117-F are for trunk and front mounting vehicular installations respectively. Also available, for AC utility equipment, is the Model TU189 which operates from a 117 VAC primary power source.

All models are of strip design and mount in the standard MOTOROLA mobile housings. The TU117 Series and the TU189 mount in a 10" wide housing.

These power supplies provide all the necessary voltages for operation of both the transmitter and receiver of the respective mobile or AC utility station and may be employed in either single- or two-frequency operation.

a. TU117 Series Power Supplies

The TU117 Series Power Supplies are specifically designed for operation with 25 watt mobile stations. Model TU117 is for trunk mount installations; Model TU117-F is for front mount installations. The TU117 and TU117-F differ only in the method of terminating the power and control cables. In both of these models, a single vibrator circuit is used to provide both the transmitter and receiver B+ voltages. A "transmit-receive" relay is employed to facilitate push-to-talk oper-

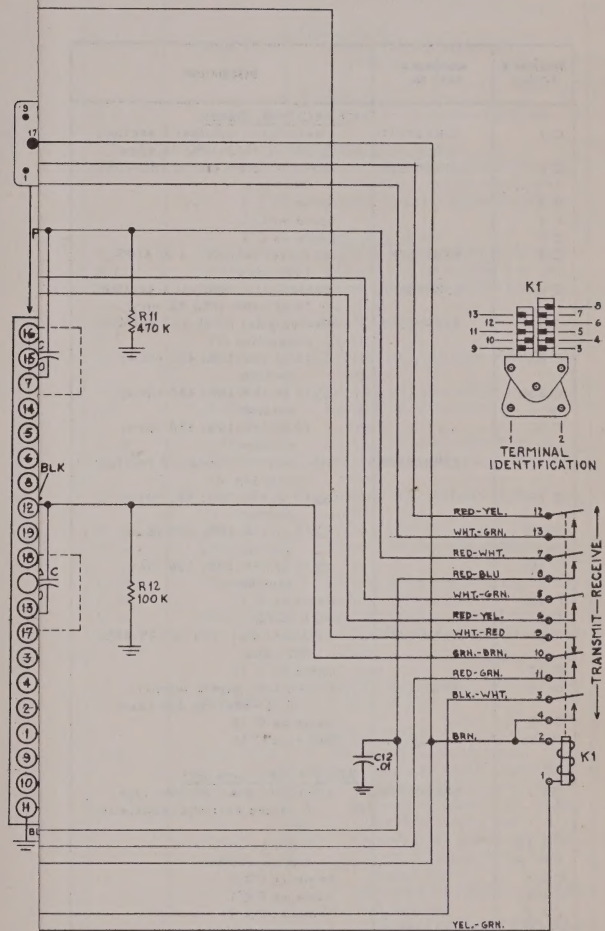
ation of the transmitter from the control head. This relay is normally in the "receive" condition and is actuated by operation of the microphone or handset push-to-talk switch. Actuation of the relay removes the receiver operating voltages and switches high voltage to the transmitter, placing the transmitter in operating condition. A HI-LOW switch is incorporated on the chassis to permit reduction of the power amplifier screen voltage. The "Low" position should be used when aligning the transmitter.

Refer to the applicable schematic diagrams for circuit details of each model.

b. TU189 Power Supply (117 VAC Operation)

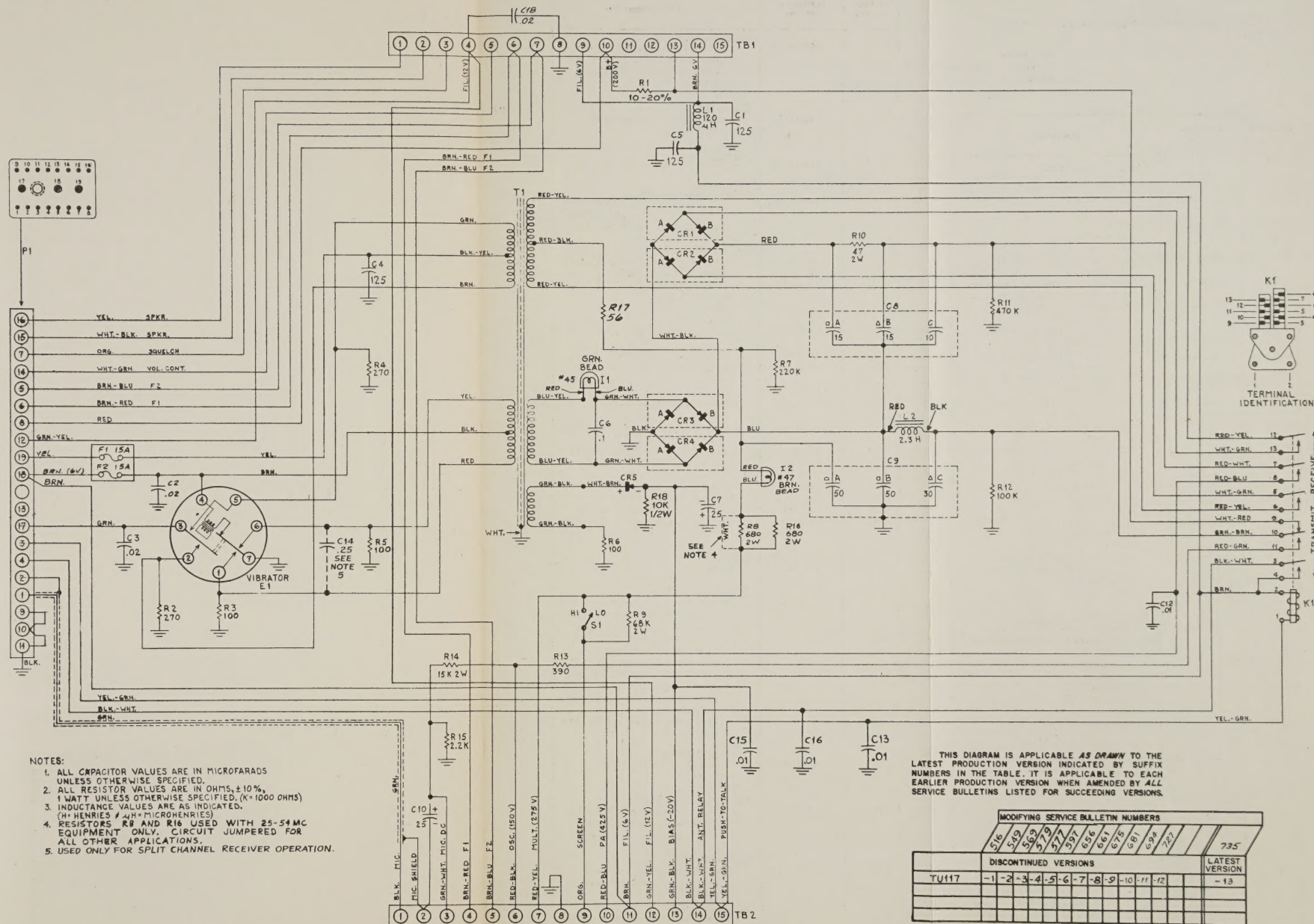
The TU189 Power Supply is specifically designed for use with AC utility station equipment. This unit operates from a 117 volt, 60 cycle primary power source to supply operating voltages for the transmitter and receiver. Two power transformers are employed; one to provide control and filament voltages for the equipment, the other to provide transmitter and receiver B+, as well as bias voltages. The TU189 employs a "transmit-receive" relay to facilitate push-to-talk functions. A HI-LOW switch connected in the transmitter power amplifier screen voltage supply permits reduction of the screen voltage for alignment purposes.

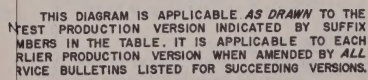
Refer to Schematic Diagram 63D835279 for circuit details of the TU189 Power Supply.



THIS DIAGRAM IS APPLICABLE *AS DRAWN* TO THE
ST PRODUCTION VERSION INDICATED BY SUFFIX
BERS IN THE TABLE. IT IS APPLICABLE TO EACH
LIER PRODUCTION VERSION WHEN AMENDED BY *ALL*
ICE BULLETINS LISTED FOR SUCCEEDING VERSIONS.

MODIFYING SERVICE BULLETIN NUMBERS													
	516	549	569	579	597	656	661	675	681	694	727	735	
DISCONTINUED VERSIONS												LATEST VERSION	
TU117	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13





MOTOROLA
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ISSUE - J 11/55-CP

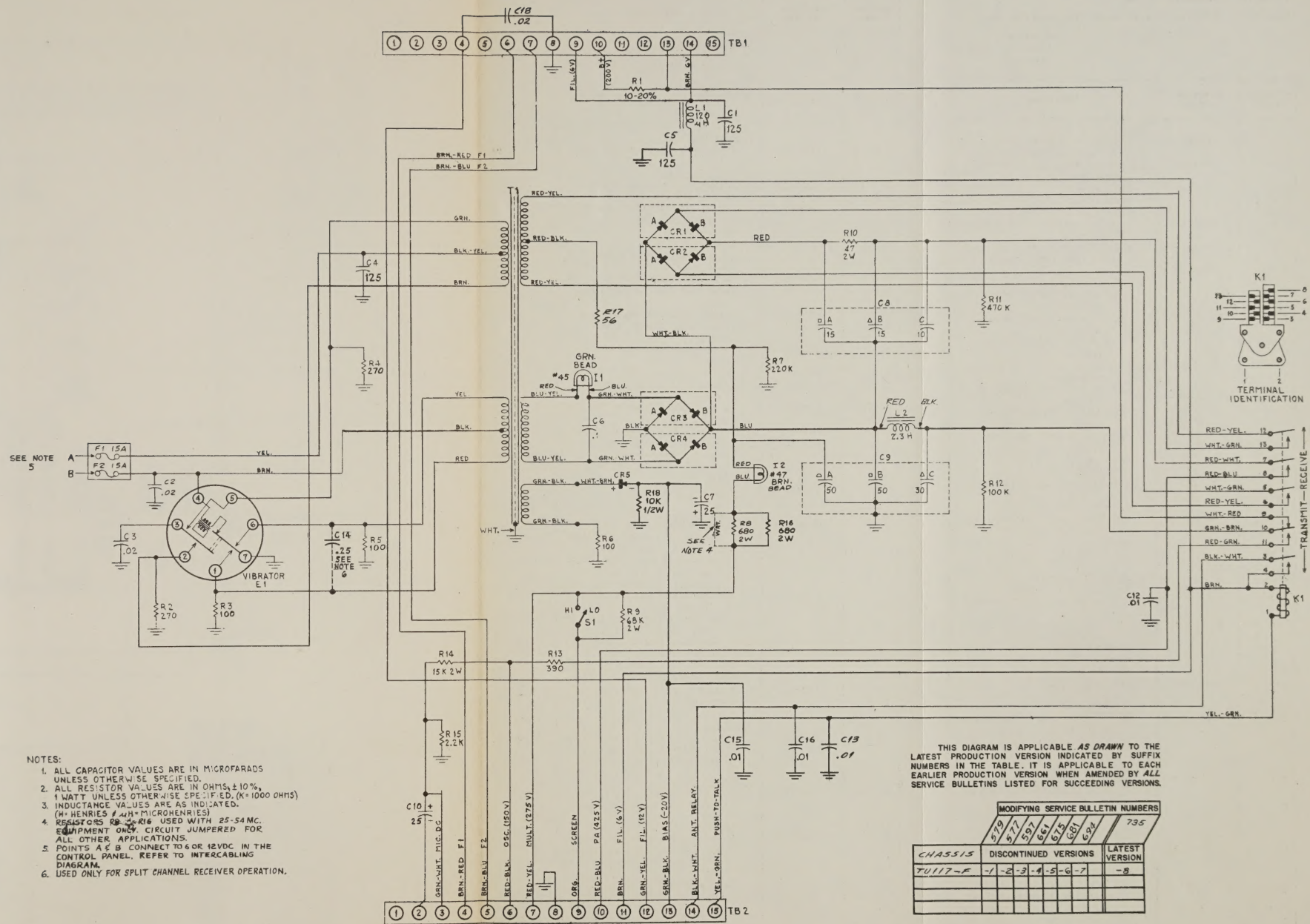
SCHEMATIC DIAGRAM PARTS LIST

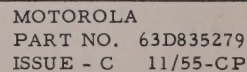
Model TU117 Vibrator Power Supply Chassis (25-30 Watt Trunk Mount)

Reference:
Schematic Diagram
63D831716

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C 1	23K840707	<u>CAPACITOR, fixed:</u> electrolytic; tubular; 1 section; 125 uf +100-10%; 16 vdcw
C 2	21R401029	ceramic; disc; .02 uf +80-20%; 500 vdcw
C 3		Same as C 2
C 4		Same as C 1
C 5		Same as C 1
C 6	8K831678	oil filled; tubular; .1 uf ±10%; 1000 vdcw
C 7	23K483807	electrolytic; tubular; 1 section; 25 uf +100-10%; 25 vdcw
C 8	23K890002	electrolytic; tubular; 3 section; consisting of: □ 15 uf +50-10%; 450 vdcw; section
C 8A		Δ 15 uf +50-10%; 450 vdcw; section
C 8B		10 uf +50-10%; 450 vdcw; section
C 8C		electrolytic; tubular; 3 section; consisting of: Δ 50 uf +50-10%; 450 vdcw; section
C 9	23K825606	□ 50 uf +50-10%; 300 vdcw; section
C 9A		Δ 30 uf +50-10%; 300 vdcw; section
C 9B		Same as C 7
C 9C		NOT USED
C 10		ceramic; disc; .01 uf +80-20%; 600 vdcw
C 11	21A801139	Same as C 12
C 12		metallized; paper; tubular; .25 uf +30-20%; 200 vdcw
C 13	8K837041	Same as C 12
C 14		Same as C 12
C 15		Same as C 12
C 16		Same as C 12
CR 1	48C800715	<u>RECTIFIER, metallic:</u> selenium; dual; doubler type; 2 series sections; consisting of: 8 plate section 8 plate section
CR 1A		Same as CR 1
CR 1B		Same as CR 1
CR 2		Same as CR 1
CR 3		Same as CR 1
CR 4		Same as CR 1
CR 5	48A800116	selenium; 1 plate
E 1	48C830082	<u>VIBRATOR,</u> Non-synchronous; 6 volt; split reed; dual interrupter type; male 7 contact plug-in base
F 1	65K804906	<u>FUSES,</u> Cartridge; one time; slo-blo; glass; 15 ampere; 32 volt; 1-1/4" long x 1/4" diameter
F 2		Same as F 1
I 1	65K831645	<u>LAMP, incandescent;</u> 3.2 volt; .35 ampere; tubular glass; single contact minia- ture bayonet base; green bead
I 2	65X11854	6-8 volt; .15 ampere; tubular glass; single contact minia- ture bayonet base; brown bead

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
K 1	80K831612	<u>RELAY, armature;</u> 6 vdc; 2 stack; contact arrange- ment; 1st stack, 1 form "A" and 1 form "C"; 2nd stack, 3 form "A"
L 1	24A812763	<u>COIL, RF;</u> Choke: 120 microhenries at 1000 cycle
L 2	25B825358	<u>REACTOR,</u> Filter: 2.3 henries at 100 ma.
P 1	28C802820	<u>CONNECTOR, plug;</u> male; 19 contact; polarized; rec- tangular; molded mica filled plastic base; cable mounted
R 1	6R118205	<u>RESISTORS, fixed:</u> carbon; 10 ohm ±20%; 1 w; ins.
R 2	6R6336	carbon; 270 ohm ±10%; 1 w; ins.
R 3	6R6415	carbon; 100 ohm ±10%; 1 w; ins.
R 4		Same as R 2
R 5		Same as R 3
R 6		Same as R 3
R 7	6R5574	carbon; 220,000 ohm ±10%; 1 w; ins.
R 8	6R490015	carbon; 680 ohm ±10%; 2 w; ins.
R 9	6R2079	carbon; 68,000 ohm ±10%; 2 w; ins.
R 10	6R488035	carbon; 47 ohm ±10%; 2 w; ins.
R 11	6R6459	carbon; 470,000 ohm ±10%; 1 w; ins.
R 12	6R6328	carbon; 100,000 ohm ±10%; 1 w; ins.
R 13	6R5598	carbon; 390 ohm ±10%; 1 w; ins.
R 14	6R5732	carbon; 15,000 ohm ±10%; 2 w; ins.
R 15	6R6409	carbon; 2200 ohm ±10%; 1 w; ins.
R 16		Same as R 8
R 17	6R2037	carbon; 56 ohm ±10%; 1 w; ins.
R 18	6R6320	carbon; 10,000 ohm ±10%; 1/2 w; ins.
S 1	40A482097	<u>SWITCH,</u> Toggle: S.P.S.T.
T 1	25D830215	<u>TRANSFORMER,</u> Power; vibrator; includes: primary #1 leads: GRN., BRN and BLK-YEL center tap primary #2 leads: YEL, RED and BLK center tap secondary #1 leads: RED-YEL, RED-YEL and RED-BLK center tap secondary #2 leads: BLU-YEL, BLU-YEL secondary #3 leads: GRN-BLK, GRN-BLK
TB 1	31B802699	<u>BOARD, terminal;</u> 14 soldering lug terminals Same as TB 1
TB 2		
XE 1	9A6776	<u>SOCKET, vibrator;</u> female; 7 contact; round molded black bakelite base; saddle mounting
XF 1, 2	31K835455	<u>FUSEHOLDER,</u> Dual fuse mounting; for 1-1/4" long x 1/4" diameter fuses
XI 1	9A813001	<u>LAMPHOLDER,</u> Miniature; single contact; molded phenolic bayonet base; includes BLU and RED coded, 4" leads Same as XI 1
XI 2		





MOTOROLA
PART NO. 63D835279
ISSUE - C 11/55-CP

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ISSUE - C 11/55-CP

MOTOROLA
PART NO. 63D835279
ISSUE - C 11/55-CP

MOTOROLA
PART NO. 63D835279
ISSUE - C 11/55-CP

SCHEMATIC DIAGRAM PARTS LIST

Model TU117-F Vibrator Power Supply Chassis (Front Mount)

Reference:
Schematic Diagram
63D835298

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		<u>CAPACITOR, fixed:</u>
C 1	23K840707	electrolytic; tubular; 1 section 125 uf +100-10%; 16 vdcw
C 2	21R401029	ceramic; disc; .02 uf +80-20%; 500 vdcw
C 3		Same as C 2
C 4		Same as C 1
C 5		Same as C 1
C 6	8K831678	oil filled; tubular; .1 uf ±10%; 1000 vdcw
C 7	23K483807	electrolytic; tubular; 1 section; 25 uf +100-10%; 25 vdcw
C 8	23K890002	electrolytic; tubular; 3 section; consisting of: □15 uf +50-10%; 450 vdcw; section
C 8A		Δ15 uf +50-10%; 450 vdcw; section
C 8B		10 uf +50-10%; 450 vdcw; section
C 9	23K825606	electrolytic; tubular; 3 section; consisting of: Δ50 uf +50-10%; 450 vdcw; section
C 9A		□50 uf +50-10%; 300 vdcw; section
C 9B		Δ30 uf +50-10%; 300 vdcw; section
C 9C		Same as C 7
C 10		NOT USED
C 11		
C 12	21A801139	ceramic; disc; .01 uf +80-20%; 600 vdcw
C 13		Same as C 12
C 14	8K837041	metallized; paper; tubular; .25 uf +30-20%; 200 vdcw
C 15		Same as C 12
C 16		Same as C 12
		<u>RECTIFIER, metallic:</u>
CR 1	48C800715	selenium; dual; doubler type; 2 series sections; consisting of: 8 plate section 8 plate section
CR 1A		Same as CR 1
CR 1B		Same as CR 1
CR 2		Same as CR 1
CR 3		Same as CR 1
CR 4		Same as CR 1
CR 5	48A800116	selenium; 1 plate
		<u>VIBRATOR,</u>
E 1	48C830082	Non-synchronous; 6 volt; split reed; dual interrupter type; male 7 contact plug-in base
		<u>FUSE, Cartridge:</u>
F 1	65K804906	one time; slo-blo; glass; 15 am- pere; 32 volt; 1-1/4" long x 1/4" diameter
F 2		Same as F 1
		<u>LAMP, incandescent:</u>
I 1	65K831645	3.2 volt; .35 ampere; tubular glass; single contact minia- ture bayonet base; green bead
I 2	65X11854	6-8 volt; .15 ampere; tubular glass; single contact minia- ture bayonet base; brown bead
		<u>RELAY, Armature:</u>
K 1	80K831612	6 vdc; 2 stack; contact arrange- ment: 1st stack, 1 form "A"

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		<u>RELAY, Armature:</u> and 1 form "C"; 2nd stack, 3 form "A"
L 1	24A812763	<u>COIL, RF:</u> Choke: 120 microhenries at 1000 cycle
L 2	25B825358	<u>REACTOR,</u> Filter: 2.3 henries at 100 ma.
		<u>RESISTOR, fixed:</u>
R 1	6R118205	carbon; 10 ohm ±20%; 1 w; ins.
R 2	6R6336	carbon; 270 ohm ±10%; 1 w; ins.
R 3	6R6415	carbon; 100 ohm ±10%; 1 w; ins.
R 4		Same as R 2
R 5		Same as R 3
R 6		Same as R 3
R 7	6R5574	carbon; 220,000 ohm ±10%; 1 w; ins.
R 8	6R490015	carbon; 680 ohm ±10%; 2 w; ins.
R 9	6R2079	carbon; 68,000 ohm ±10%; 2 w; ins.
R 10	6R488035	carbon; 47 ohm ±10%; 2 w; ins.
R 11	6R6459	carbon; 470,000 ohm ±10%; 1 w; ins.
R 12	6R6328	carbon; 100,000 ohm ±10%; 1 w; ins.
R 13	6R5598	carbon; 390 ohm ±10%; 1 w; ins.
R 14	6R5732	carbon; 15,000 ohm ±10%; 2 w; ins.
R 15	6R6409	carbon; 2200 ohm ±10%; 1 w; ins.
R 16		Same as R 8
R 17	6R2037	carbon; 56 ohm ±10%; 1 w; ins.
R 18	6R6320	carbon; 10,000 ohm ±10%; 1/2 w; ins.
		<u>SWITCH,</u> Toggle: S. P. S. T.
S 1	40A482097	
		<u>TRANSFORMER,</u> Power: vibrator; includes: primary #1 leads: GRN, BRN and BLK-YEL center tap primary #2 leads: YEL, RED and BLK center tap secondary #1 leads: RED-YEL, RED-YEL and RED-BLK center tap secondary #2 leads: BLU-YEL, BLU-YEL secondary #3 leads: GRN-BLK, GRN-BLK
T 1	25D830215	
		<u>BOARD, terminal:</u> 14 soldering lug terminals Same as TB 1
TB 1	31B802699	
TB 2		
		<u>SOCKET,</u> Vibrator: female; 7 contact; round molded black bakelite base; saddle mounting
XE 1	9A6776	
		<u>FUSEHOLDER,</u> Dual fuse mounting; for 1-1/4" long x 1/4" diameter fuses
XF 1, 2	31K835455	
		<u>LAMPHOLDER,</u> Miniature; single contact; molded phenolic bayonet base; includes BLUE and RED coded, 4" long leads Same as XI 1
XI 1	9A813001	
XI 2		

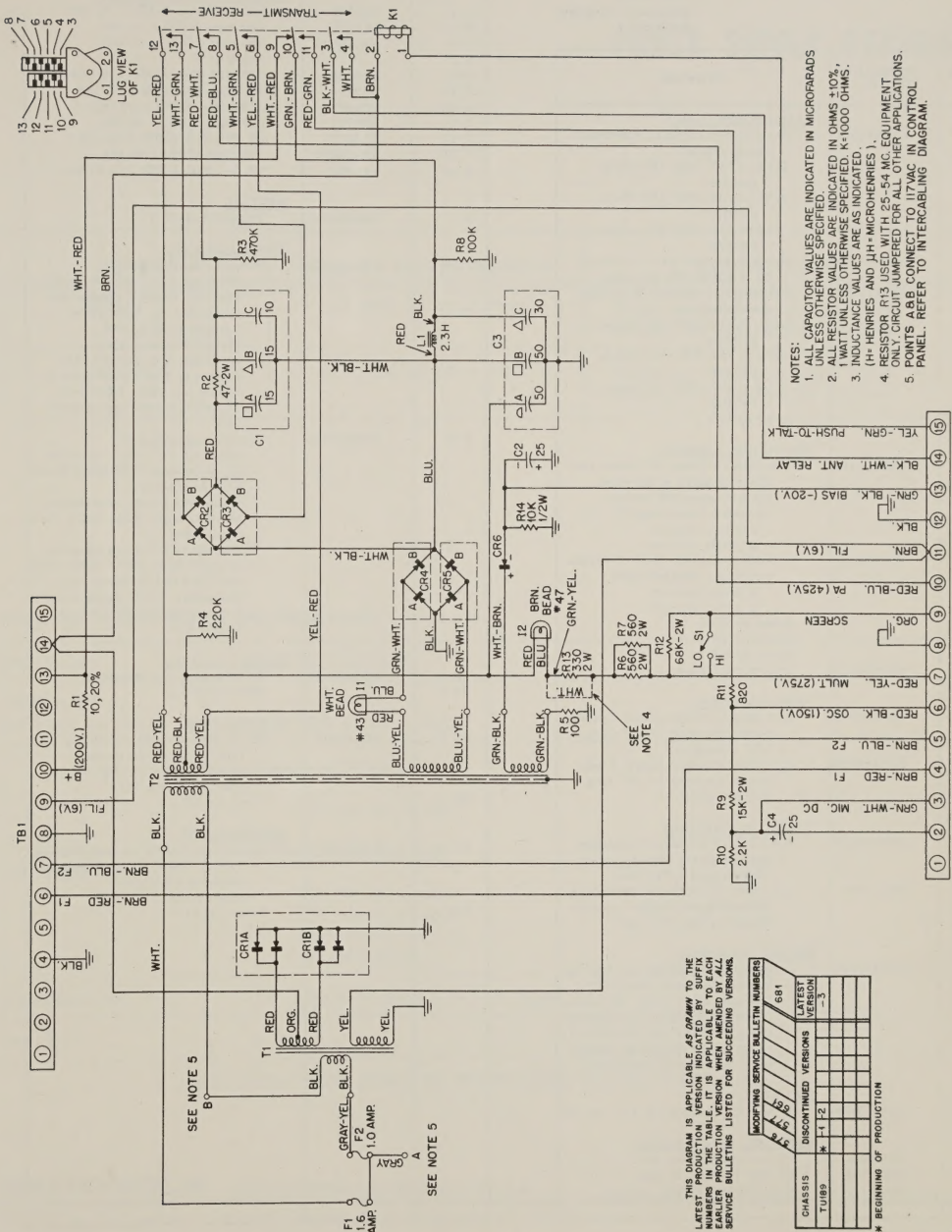


DIAGRAM NO. 630835279

SCHEMATIC DIAGRAM PARTS LIST

Model TU189 AC Power Supply Chassis (25-30 Watt)

Reference:
Schematic Diagram
63D835279

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		<u>CAPACITORS, fixed:</u>
C 1	23K890002	electrolytic; tubular; 3 section; consisting of:
C 1A		□15 uf +50-10%; 450 vdcw; section
C 1B		Δ15 uf +50-10%; 450 vdcw section
C 1C		10 uf +50-10%; 450 vdcw section
C 2	23K483807	electrolytic; tubular; 1 section; 25 uf +100-10%; 25 vdcw
C 3	23K825606	electrolytic; tubular; 3 section; consisting of:
C 3A		Δ50 uf +50-10%; 450 vdcw; section
C 3B		□50 uf +50-10%; 300 vdcw; section
C 3C		Δ30 uf +50-10%; 300 vdcw; section
C 4		Same as C 2
		<u>RECTIFIER, metallic:</u>
CR 1	48K811619	selenium; 4 plate; full wave rectifier; 2 pairs of parallel plates connected series opposed; consisting of:
CR 1A		2 plate; section
CR 1B		2 plate; section
CR 2	48C800715	selenium; doubler type; 2 series sections; consisting of:
CR 2A		8 plate; section
CR 2B		8 plate; section
CR 3		Same as CR 2
CR 4		Same as CR 2
CR 5		Same as CR 2
CR 6	48A800116	selenium; 1 plate
		<u>FUSE, cartridge:</u>
F 1	65K804909	one time; slo-blo; glass; 1.6 ampere; 125 volt; 1-1/4" long x 1/4" diameter
F 2	65K804910	one time; slo-blo; glass; 1 ampere; 125 volt; 1-1/4" long x 1/4" diameter
		<u>LAMP, incandescent:</u>
I 1	65K810328	2.5 volt; .5 ampere; miniature bayonet base; single contact; tubular glass; #43 type
I 2	65X11854	6.3 volt; .15 ampere; miniature bayonet base; single contact; tubular glass; #47 type
		<u>RELAY, armature:</u>
K 1	80K831612	contact arrangement; 1st pile up, 1 form "A" and 1 form "C"; 2nd pile up, 3 form "A"; does not include 15A811737 COVER, relay or 7A811735 BRACKET, relay cover mounting; which must be ordered separately
		<u>REACTOR,</u>
L 1	25B825358	Filter: 2.3 henries at 100 ma. dc
		<u>RESISTOR, fixed: carbon:</u>
R 1	6R118205	10 ohm ±20%; 1 w; ins.
R 2	6R488035	47 ohm ±10%; 2 w; ins.
R 3	6R6459	470,000 ohm ±10%; 1 w; ins.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		<u>RESISTOR, fixed: carbon:</u>
R 4	6R5574	220,000 ohm ±10%; 1 w; ins.
R 5	6R6415	100 ohm ±10%; 1 w; ins.
R 6	6R488036	560 ohm ±10%; 2 w; ins.
R 7		Same as R 6
R 8	6R6328	100,000 ohm ±10%; 1 w; ins.
R 9	6R5732	15,000 ohm ±10%; 2 w; ins.
R 10	6R6409	2200 ohm ±10%; 1 w; ins.
R 11	6R5701	820 ohm ±10%; 1 w; ins.
R 12	6R2079	68,000 ohm ±10%; 2 w; ins.
R 13	6R488037	330 ohm ±10%; 2 w; ins.
R 14	6R6320	10,000 ohm ±10%; 1/2 w; ins.
		<u>SWITCH,</u>
S 1	40A482097	Toggle: S. P. S. T.
		<u>TRANSFORMER,</u>
T 1	25C800144	Power: consisting of: primary: 117 volt, 60 cycle, BLACK, BLACK conductors secondary #1: 6.3 volt at 7 ampere; YELLOW, YELLOW conductors secondary #2: 16 volt at 2 amperes, 8 volt each side of center tap RED, RED with ORANGE center tap conductors
T 2	25D835532	Power: consisting of: primary: 117 volt, 60 cycle; dc resistance 3.05 ohm; BLK, BLK conductors secondary #1: dc resistance 25 ohm; BLU-YEL, BLU-YEL conductors secondary #2: dc resistance 42 ohm; RED-YEL, RED-YEL with RED-BLK center tap secondary #3: dc resistance 3 ohm; GRN-BLK, GRN-BLK conductors
		<u>BOARD, terminal:</u>
TB 1	31B802699	14 soldering lug terminal
TB 2		Same as TB 1
		<u>FUSEHOLDER,</u>
XF 1	9B820279	Single fuse mounting; female type; single hole chassis mounting; for 1-1/4" long x 1/4" diameter fuse
XF 2		Same as XF 1
		<u>LAMPHOLDER,</u>
XI 1	9A813001	Miniature; single contact molded bayonet base; chassis mounted includes BLU, RED conductors
XI 2		Same as XI 1

POWER SUPPLY CHASSIS

MODEL	PRIMARY POWER SOURCE	APPLICATION
TU212	6.3 VDC or 12.6 VDC	Single or two-frequency, trunk mount, 10 watt mobile stations
TU212-F	6.3 VDC or 12.6 VDC	Single or two-frequency, front mount, 10 watt mobile stations

NOMINAL PERFORMANCE SPECIFICATIONS

MODELS	TU212, TU212-F
PRIMARY POWER SOURCE	6.3 VDC or 12.6 VDC
VOLTAGE RATINGS	<u>Receiver Section:</u> 190 vdc at 70 ma. <u>Transmitter Section:</u> 140 vdc at 15 ma. 270 vdc at 40 ma. 335 vdc at 120 ma. -17 vdc Bias
DIMENSIONS	15" long x 3" wide x 5-1/4" high
WEIGHT	9 lbs.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

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1. DESCRIPTION

MOTOROLA Models TU212 and TU212-F are universal type mobile power supplies expressly designed for use with MOTOROLA 10 Watt Two-Way Radio equipment, utilizing the UNIVERSAL UNI-CHANNEL type receiver. These heavy duty power chassis include a dual interrupter non-synchronous vibrator, a multi-winding power transformer, three selenium rectifier DC voltage supply circuits and a "transmit - receive" control relay. All necessary voltages for operation of the transmitter and receiver of 10 watt mobile station models are supplied by these chassis.

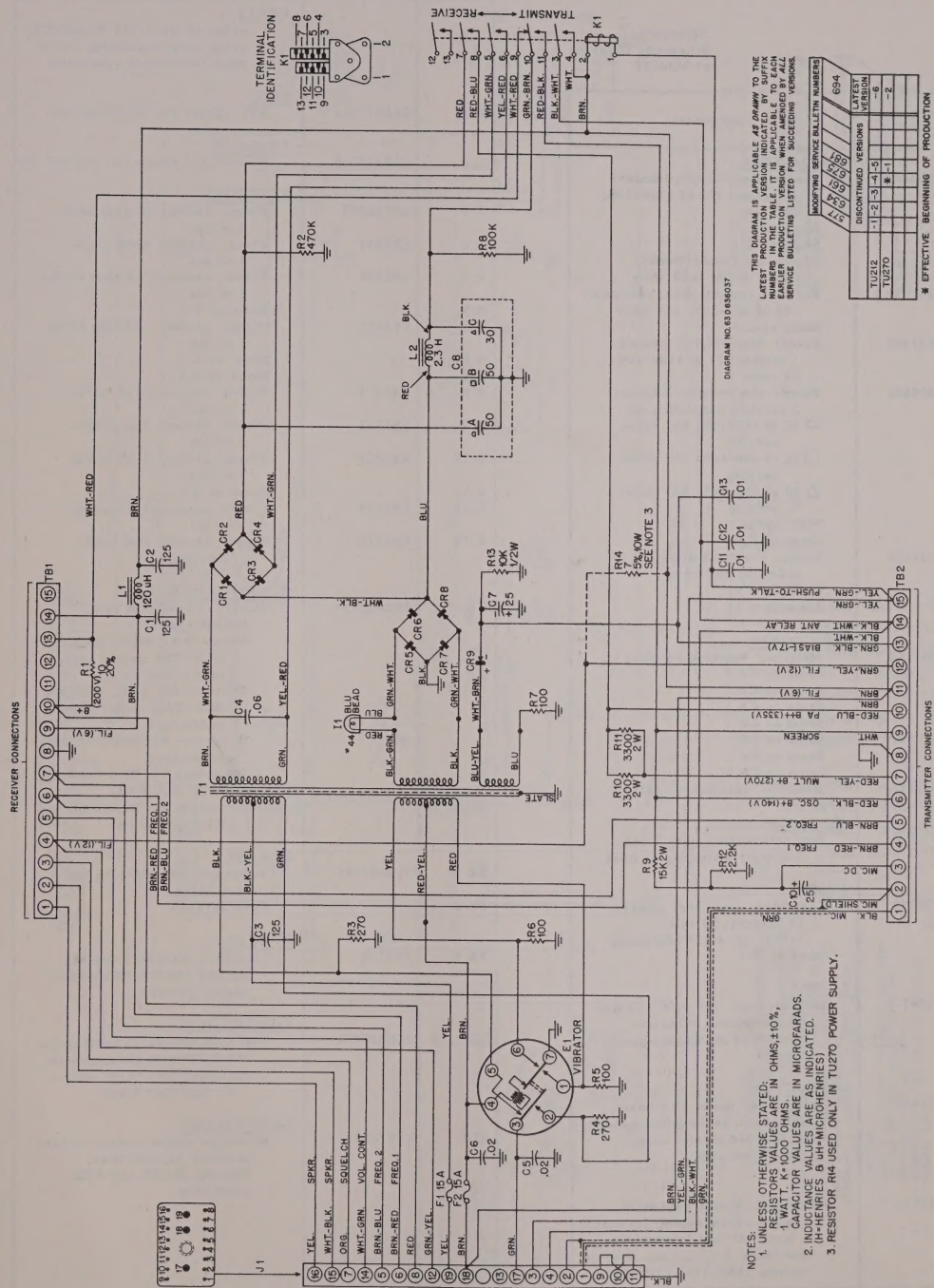
Model TU212 Power Supply incorporates a 19 contact male receptacle to facilitate interconnection with the female plug on the end of the power and control cable of trunk mount mobile radio installations. The TU212-F is designed specifically for use with front mount equipment and will require that power and control connections be made directly from the equipment control panel to specific terminals on the power supply chassis. With exception of termination facilities, the TU212 and TU212-F Power Supply Chassis are identical.

Universal design permits operation of these power supply chassis from either a 6.3 VDC or

12.6 VDC vehicular battery source and with either single or two-frequency mobile radio equipment. This diversified application is accomplished by use of an applicable cable kit and/or control unit to accommodate the desired operation.

Both the TU212 and TU212-F Power Supplies employ a single heavy duty type vibrator requiring a relatively low input power. The three selenium rectifier circuits provide transmitter high (B++) voltage (top circuit shown on diagram), transmitter/receiver B+ voltage (middle circuit), and transmitter bias voltage respectively. The filaments are supplied from a 6 volt bus when operating on a 6.3 VDC primary power source or from two independent 6 volt busses when operating on 12.6 VDC.

A "transmit-receive" relay is incorporated on these power supplies to facilitate "push-to-talk" operation of the mobile equipment from the control unit. All transmitter and receiver switching functions are performed by means of this relay. Power supply fusing is provided by two 15 ampere cartridge type fuses connected in the primary input circuit of the power supply chassis.



THIS DIAGRAM IS APPLICABLE AS DRAWN TO THE LATEST REVISION OF THE TU212 POWER SUPPLY SERVICE BULLETIN LISTED FOR SUCCEEDING REVISIONS.

REVISION	DATE	DESCRIPTION
1	1-1-53	INITIAL
2	1-1-53	INITIAL
3	1-1-53	INITIAL
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98	1-1-53	INITIAL
99	1-1-53	INITIAL
100	1-1-53	INITIAL

† EFFECTIVE BEGINNING OF PRODUCTION

DIAGRAM NO. 63D86037

- NOTES:
- UNLESS OTHERWISE STATED, RESISTOR VALUES ARE IN OHMS, ±10%, 1 WATT, K=1000 OHMS.
 - INDUCTOR VALUES ARE IN MICROFARADS.
 - INDUCTOR VALUES ARE IN MICROHENRIES.
 - RESISTOR R14 USED ONLY IN TU212 POWER SUPPLY.

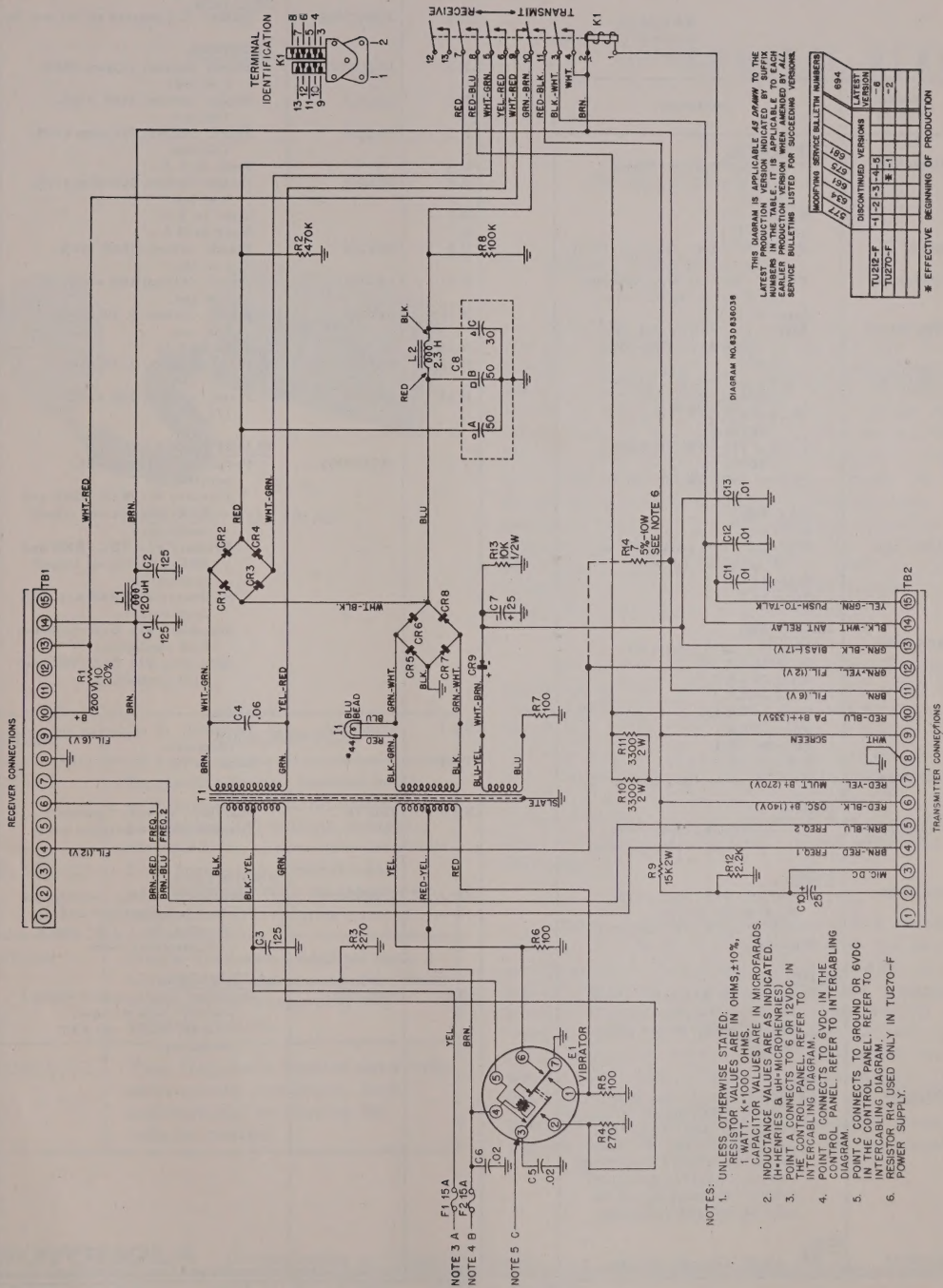
SCHEMATIC DIAGRAM PARTS LIST

TU212 Vibrator Power Supply (10 Watt) Trunk Mount

Reference:
Schematic Diagram
63D836037

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C 1	23K840707	<u>CAPACITORS,</u> Fixed: electrolytic; tubular; 1 section; 125 uf +100-10%; 16 vdcw
C 2		Same as C 1
C 3		Same as C 1
C 4	8B800146	Fixed: oil filled; tubular; .06 uf $\pm 10\%$; 1600 vdcw
C 5	21B401029	Fixed: ceramic; disc; shielded; .02 uf +80-20%; 600 vdcw
C 6		Same as C 5
C 7	23K483807	Fixed: electrolytic; tubular; 1 section; 25 uf +100-10%; 25 vdcw
C 8	23K825606	Fixed: electrolytic; tubular; 3 section; consisting of: $\triangle$ 50 uf +50-10%; 450 vdcw; section
C 8A		$\square$ 50 uf +50-10%; 300 vdcw; section
C 8B		$\triangle$ 30 uf +50-10%; 300 vdcw; section
C 8C		NOT USED
C 9		Same as C 7
C 10		Fixed: ceramic; disc; .01 uf +80-20%; 600 vdcw
C 11	21A801139	Same as C 11
C 12		Same as C 11
C 13		Same as C 11
CR 1	48D842140	<u>RECTIFIERS,</u> Metallic: selenium; 6 plate
CR 2		Same as CR 1
CR 3		Same as CR 1
CR 4		Same as CR 1
CR 5		Same as CR 1
CR 6		Same as CR 1
CR 7		Same as CR 1
CR 8		Same as CR 1
CR 9	48A800116	Metallic: selenium; 1 plate
E 1	48C830082	<u>VIBRATOR,</u> Dual interrupter type; 6 volt; 7 contact male plug-in base
F 1	65K838299	<u>FUSES,</u> Cartridge: one time; glass; 15 ampere; 32 volt; 1-1/4" lg. x 1/4" diameter
F 2		Same as F 1
I 1	65X10867	<u>LAMP,</u> Incandescent: 6-8 volt; .25 ma; single contact miniature bayonet base; tubular glass; type 44
J 1	28C802820	<u>CONNECTOR,</u> Receptacle: male; 19 contact; polarized; rectangular molded mica filled plastic base; chassis mounted
K 1	80K831612	<u>RELAY,</u> Armature: 6 volt; dual stack; contact arrangement; 1st stack; 1 form "A" and 1 form "C"; 2nd stack; 3 form "A", does not include 15A811737 COVER,

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		<u>RELAY,</u> relay or 7A811735 BRACKET, relay cover mounting; which must be ordered separately
L 1	24A812763	<u>COIL,</u> RF: choke; 120 microhenries
L 2	25B825358	<u>REACTOR,</u> Filter: 2.3 henries at 100 ma. dc
R 1	6R118205	<u>RESISTORS,</u> Fixed: carbon; 10 ohm $\pm 20\%$; 1 w; ins.
R 2	6R6459	Fixed: carbon; 470K $\pm 10\%$; 1 w; ins.
R 3	6R6336	Fixed: carbon; 270 ohm $\pm 10\%$; 1 w; ins.
R 4		Same as R 3
R 5	6R6415	Fixed: carbon; 100 ohm $\pm 10\%$; 1 w; ins.
R 6		Same as R 5
R 7		Same as R 5
R 8	6R6328	Fixed: carbon; 100K $\pm 10\%$; 1 w; ins.
R 9	6R5732	Fixed: carbon; 15K $\pm 10\%$; 2 w; ins.
R 10	6R2029	Fixed: carbon; 3.3K $\pm 10\%$; 2 w; ins.
R 11		Same as R 10
R 12	6R6409	Fixed: carbon; 2.2K $\pm 10\%$; 1 w; ins.
R 13	6R6320	Fixed: carbon; 10K $\pm 10\%$; 1/2 w; ins.
T 1	25C800136	<u>TRANSFORMER,</u> Power: vibrator; 6 volt; consists of: Primary #1: BLK, GRN and BLK-YEL center tapped conductors Primary #2: YEL, RED and RED-YEL center tapped conductors Secondary #1: BRN and GRN conductors Secondary #2: BLK-GRN and BLK conductors Secondary #3: BLU-YEL and BLU conductors
TB 1	31B802699	<u>BOARDS,</u> Terminal: 14 soldering lug terminals
TB 2		Same as TB 1
XE 1	9A6776	<u>SOCKET,</u> Vibrator: female; 7 contact; molded black bakelite base; saddle mounting
XF 1, 2	31K835455	<u>FUSEHOLDER,</u> Dual fuse mounting; rectangular black bakelite base; chassis mounted; for 1-1/4" long x 1/4" diameter fuses
XI 1	9A813001	<u>LAMPHOLDER,</u> Miniature single contact molded phenolic bayonet base; includes BLUE and RED conductor



SCHEMATIC DIAGRAM PARTS LIST

TU212-F Vibrator Power Supply (10 Watt) Front Mount

Reference:
Schematic Diagram
63D836038

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C 1	23K840707	<u>CAPACITORS,</u> Fixed: electrolytic; tubular; 1 section; 125 uf +100-10%; 16 vdcw
C 2		Same as C 1
C 3		Same as C 1
C 4	8B800146	Fixed: oil filled; tubular; .06 uf ±10%; 1600 vdcw
C 5	21B401029	Fixed: ceramic; disc; shielded; .02 uf +80-20%; 600 vdcw
C 6		Same as C 5
C 7	23K483807	Fixed: electrolytic; tubular; 1 section 25 uf +100-10%; 25 vdcw
C 8	23K825606	Fixed: electrolytic; tubular; 3 section; consisting of: △ 50 uf +50-10%; 450 vdcw; section
C 8A		□ 50 uf +50-10%; 300 vdcw; section
C 8B		△ 30 uf +50-10%; 300 vdcw; section
C 8C		NOT USED
C 9		Same as C 7
C 10		Same as C 7
C 11	21A801139	Fixed: ceramic; disc; .01 uf +80-20%; 600 vdcw
C 12		Same as C 11
C 13		Same as C 11
CR 1	48D842140	<u>RECTIFIERS,</u> Metallic: selenium; 6 plate
CR 2		Same as CR 1
CR 3		Same as CR 1
CR 4		Same as CR 1
CR 5		Same as CR 1
CR 6		Same as CR 1
CR 7		Same as CR 1
CR 8		Same as CR 1
CR 9	48A800116	Metallic: selenium; 1 plate.
E 1	48C830082	<u>VIBRATOR,</u> Dual interrupter type; 6 volt; 7 contact male plug-in base
F 1	65K838299	<u>FUSES,</u> Cartridge: one time; glass; 15 ampere; 32 volt; 1-1/4" lg. x 1/4" diameter
F 2		Same as F 1
I 1	65X10867	<u>LAMP,</u> Incandescent: 6-8 volt; .25 ma; single contact miniature bayonet base; tubular glass; type 44
K 1	80K831612	<u>RELAY,</u> Armature: 6 volt; dual stack; contact arrangement; 1st stack; 1 form "A" and 1 form "C"; 2nd stack; 3 form "A", does not include 15A811737 COVER, relay or 7A811735 BRACKET, relay cover mounting; which must be ordered separately
L 1	24A812763	<u>COIL,</u> RF: choke; 120 microhenries

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
L 2	25B825358	<u>REACTOR,</u> Filter: 2.3 henries at 100 ma. dc
R 1	6R118205	<u>RESISTORS,</u> Fixed: carbon; 10 ohm ±20%; 1 w; ins.
R 2	6R6459	Fixed: carbon; 470K ±10%; 1 w; ins.
R 3	6R6336	Fixed: carbon; 270 ohm ±10%; 1 w; ins.
R 4		Same as R 3
R 5	6R6415	Fixed: carbon; 100 ohm ±10%; 1 w; ins.
R 6		Same as R 5
R 7		Same as R 5
R 8	6R6328	Fixed: carbon; 100K ±10%; 1 w; ins.
R 9	6R5732	Fixed: carbon; 15K ±10%; 2 w; ins.
R 10	6R2029	Fixed: carbon; 3.3K ±10%; 2 w; ins.
R 11		Same as R 10
R 12	6R6409	Fixed: carbon; 2.2K ±10%; 1 w; ins.
R 13	6R6320	Fixed: carbon; 10K ±10%; 1/2 w; ins.
T 1	25C800136	<u>TRANSFORMER,</u> Power: vibrator; 6 volt; consists of: Primary #1: BLK, GRN and BLK-YEL center tapped conductors Primary #2: YEL, RED and RED-YEL center tapped conductors Secondary #1: BRN and GRN conductors Secondary #2: BLK-GRN and BLK conductors Secondary #3: BLU-YEL and BLU conductors
TB 1	31B802699	<u>BOARDS,</u> Terminal: 14 soldering lug terminals
TB 2		Same as TB 1
XE 1	9A6776	<u>SOCKET,</u> Vibrator: female; 7 contact; molded black bakelite base; saddle mounting
XF 1, 2	31K835455	<u>FUSEHOLDER,</u> Dual fuse mounting; rectangular black bakelite base; chassis mounted; for 1-1/4" long x 1/4" diameter fuses
XI 1	9A813001	<u>LAMPHOLDER,</u> Miniature single contact molded phenolic bayonet base; includes BLUE and RED conductor

CONTROL HEADS



TU124A CONTROL HEAD

1. DESCRIPTION

MOTOROLA control heads are designed to provide complete control facilities for 2-way mobile transmitter and receiver installations. Various models are available to fulfil the requirements of diversified applications. Model variations involve the use of an integral microphone, external microphone or handset connector, and/or two-frequency selector switch. Refer to the model chart for specific model identification. All control heads feature self-contained junction facilities for control cable, speaker, and microphone connections. The mechanical design allows versatile mounting with adjustable angle provisions for easy access to the controls.

The green "Power On-Off" pilot indicator is wired in series with the "A" power relay as a visual indication of proper operation of the relay. When the "Power On-Off" switch is turned "on", illumination of the pilot lamp indicates that the "A" power relay is closed, completing the filament circuits. When the "Power On-Off" switch is turned "off" the green pilot indicator will go out, indicating that the "A" power relay has deenergized.

The two-frequency control head is identified with a -C2 suffix and is identical to the corresponding single-frequency model except for the addition of a two-frequency switch and associated leads. The two-frequency selector switch provides for manual selection of either of two operating channels. In transmitter-receiver models where both units are of the two-frequency type, the selection is simultaneous. For individual selection of transmitter and receiver channels, special control head facilities will be required.

MODEL	DESCRIPTION
TU124A	Single-frequency control head with military type microphone; employing DC volume control.
TU124A-C2	Two-frequency control head with military type microphone; employing DC volume control.
TU203A	Single-frequency control head with microphone connector, less microphone; employing DC volume control.
TU203A-C2	Two-frequency control head with microphone connector, less microphone; employing DC volume control.

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The standard control facilities include:

- a. Variable VOLUME control with power "On-Off" Switch.
- b. Variable SQUELCH control.
- c. Green "Power On-Off" pilot indicator.
- d. Red "Transmit On-Off" pilot indicator.

The TU203A Series Control Heads are supplied with provisions for connection of a military or noise cancelling type microphone or a telephone type handset. The MOTOROLA TU343 Military type and P-7255-A Noise Cancelling type microphones or the P-278-F Handset recommended for this purpose. These items must be ordered separately as required.

Refer to Schematic Diagram 63D839313 for complete wiring details of the TU124A Series Control Head.

Refer to Schematic Diagram 63D839314 for complete wiring details of the TU203A Series Control Head.

2. TRANSMITTER INPUT CONSIDERATION

When a control head with military microphone is used, the shielded input lead to the grid of the 1st IDC amplifier on the transmitter must be connected to the Pos. 1 tap on the input divider (see applicable transmitter schematic diagram). When a control head with handset is used, the shielded lead must be connected to Pos. 2 on the divider network.

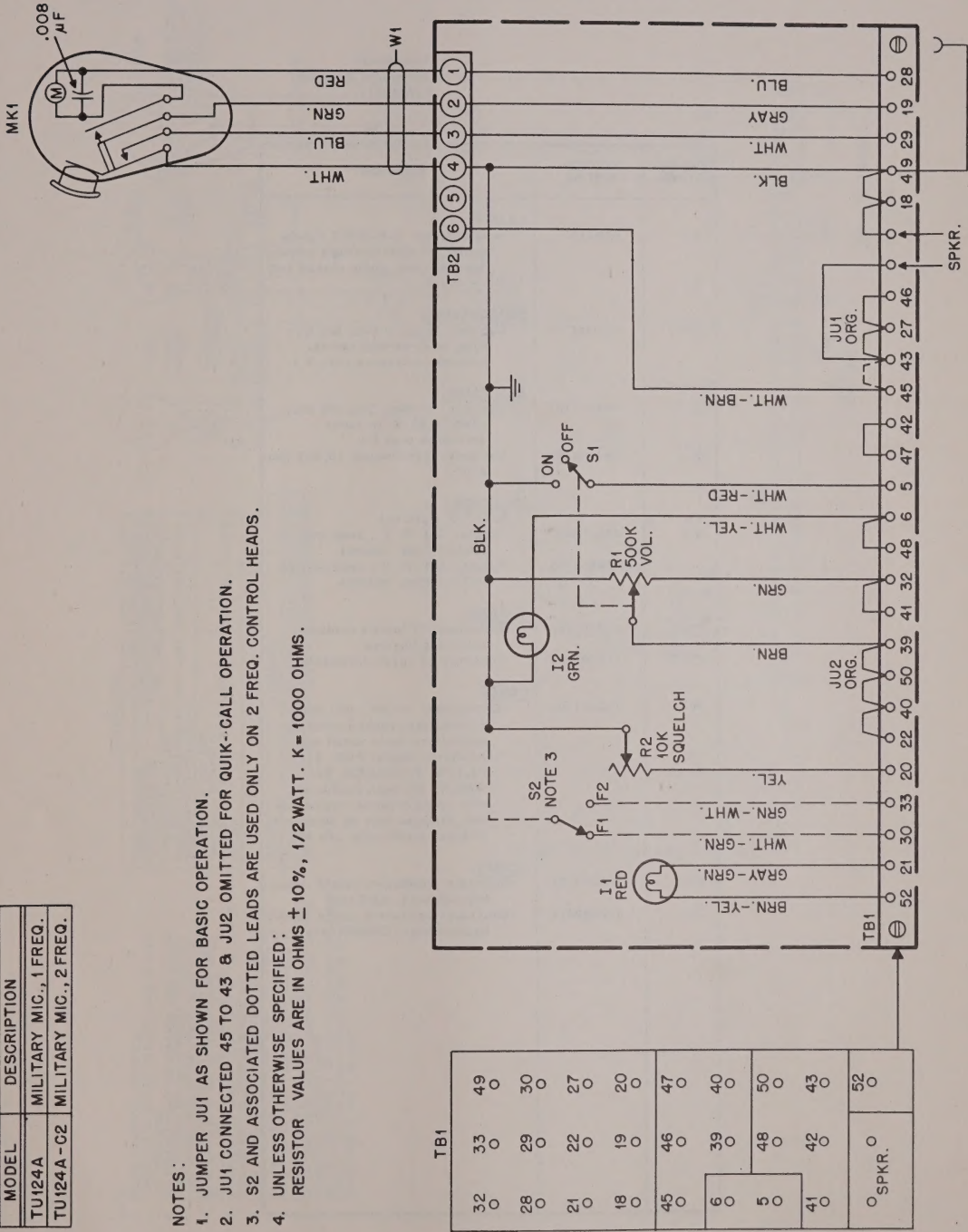
NOTE

If a handset is ordered with a mobile station incorporating a TU203A Series Control Head, the transmitter will be wired for handset operation at the factory. If the mobile station is ordered without a handset, or with either a military or noise cancelling type microphone, the transmitter will be connected for microphone input.

MODEL	DESCRIPTION
TU124A	MILITARY MIC., 1 FREQ.
TU124A-C2	MILITARY MIC., 2 FREQ.

NOTES:

1. JUMPER J01 AS SHOWN FOR BASIC OPERATION.
2. J01 CONNECTED 45 TO 43 & J02 OMITTED FOR QUIK-CALL OPERATION.
3. S2 AND ASSOCIATED DOTTED LEADS ARE USED ONLY ON 2 FREQ. CONTROL HEADS.
4. UNLESS OTHERWISE SPECIFIED: RESISTOR VALUES ARE IN OHMS $\pm 10\%$, $1/2$ WATT. K = 1000 OHMS

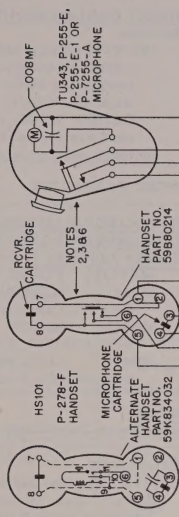


SCHEMATIC DIAGRAM PARTS LIST

TU124A Series Control Head and Microphone

Reference:
Schematic Diagram
63D839313

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
I 1	65X4151	<u>LAMPS,</u> Incandescent: 6-8 volt; 1 candle power; miniature single contact bayonet base; globe shaped bulb
I 2		Same as I 1
MK 1	50D844798	<u>MICROPHONE,</u> Carbon: single button; Military type; push-to-talk switch; includes reference part W 1
R 1	18A822301	<u>RESISTORS,</u> Variable: carbon; 500,000 ohm $\pm 10\%$; 2.25 W; includes reference part S 1
R 2	18A890193	Variable: wire wound; 10,000 ohm $\pm 10\%$
S 1		<u>SWITCHES,</u> S. P. S. T.; p/o R 1
S 2	40A80248	Toggle: S. P. D. T.; used only on (-C2) 2-freq. models
	or 40K811753	Toggle: S. P. D. T.; used only on (-C2) 2-freq. models
TB 1	31B893462	<u>BOARDS,</u> Terminal: 27 female contacts; soldering lug type
TB 2	31A890699	Terminal: 6 screw terminals
W 1	30B891505	<u>CORD,</u> Microphone: coiled cord; tinsel; 4 conductor; rubber covered; conductors color coded and numbered bands; RED, #1; BLACK, #2; GREEN, #3; WHITE, #4; each conductor with spade terminal lug on one end; stripped only on other end; includes strain clip; p/o MK 1
XI 1	60A890181	<u>LIGHTS,</u> Indicator: miniature single contact bayonet base; RED lens
XI 2	60K890479	Indicator: miniature single contact bayonet base; GREEN lens

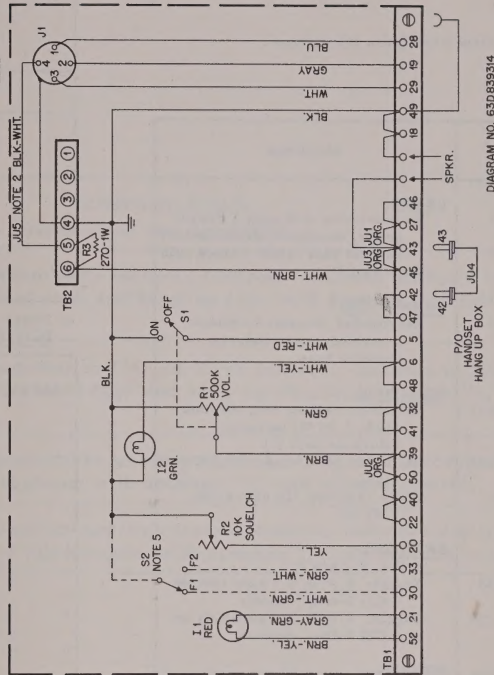


JUMPER CHART

	JU1	JU2	JU3	JU4	JU5
BASIC OPERATION	USED	USED	USED	OMIT	NOTE 2
WITH HANG UP BOX AND HANDSET	OMIT	USED	OMIT	USED	NOTE 2
WITH HANG UP BOX AND HANDSET WHEN HANDSET IS IN USE	OMIT	OMIT	OMIT	OMIT	NOTE 2
WITH HANG UP BOX AND QUICK CALL (SPEAKER NOT USED WHEN HANDSET IS IN USE)	USED	OMIT	OMIT	OMIT	NOTE 2

MODEL	DESCRIPTION
TU203A	WITH MICROPHONE CONNECTOR, LESS MICROPHONE, FREQ.
TU203A-C2	WITH MICROPHONE CONNECTOR, LESS MICROPHONE, 2 FREQ.

- NOTES:
- UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE IN OHMS, $\pm 10\%$, $\frac{1}{2}$ WATT.
K = 1000 OHMS
 - JU5 CONNECTION AT TB2 DEPENDS UPON MIC (OR HANDSET) USED. IF P-275-F IS USED, CONNECT AS SHOWN. IF P-225-A IS USED, CONNECT AS SHOWN. (AS SHIPPED FROM FACTORY, FOR P-225-E OR P-225-A, MOVE JU5 TO TERMINAL 4 ON RE-WIRE.)
 - MICROPHONE OR HANDSET IS NOT PART OF THE CONTROL HEAD AND MUST BE ORDERED SEPARATELY.
 - UNITS SHIPPED WITH JUMPERS CONNECTED FOR SPECIFIED OPERATION. UNLESS OTHERWISE SPECIFIED, THE UNIT WILL BE SHIPPED WITH ALL JUMPERS EXCEPT JU4 CONNECTED AS SHOWN, ADD OR OMIT JUMPERS AS REQUIRED FOR SPECIFIC OPERATION. REFER TO JUMPER CHART.
 - RESISTORS R1, R2, AND R3 ARE USED ONLY ON 2 FREQUENCY CONTROL HEADS.
 - DOTTED LEAD TO PIN 4 OF P201 IS USED ON P-255-E (NOT P-225-E OR TU543) AND P-225-A IN PLACE OF CONNECTION TO SHELL OR P201.



TB1	32	33	49
O	O	O	O
28	O	29	30
O	O	O	O
21	22	27	
O	O	O	
18	19	20	
O	O	O	
45	46	47	
O	O	O	
6	39	40	
O	O	O	
5	48	50	
O	O	O	
41	42	43	
O	O	O	
O	SPKR.	O	52

SCHEMATIC DIAGRAM PARTS LIST

Reference:
Schematic Diagram
63D839314

1. TU203A Series Control Head (Less Microphone)

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
I 1	65X4151	<u>LAMPS,</u> Incandescent: 6-8 volt; 1 candle power; miniature single contact bayonet base; globe shaped bulb
I 2		Same as I 1
J 1	9B16345	<u>CONNECTOR,</u> Receptacle: female; 4 contact; polarized; round chassis mounted base
R 1	18A822301	<u>RESISTORS,</u> Variable: carbon; 500,000 ohm $\pm 10\%$; 2.25 W; includes reference part S 1
R 2	18A890193	Variable: wire wound; 10,000 ohm $\pm 10\%$
R 3	6R6336	Fixed: carbon; 270 ohm $\pm 10\%$; 1 W; ins.
S 1		<u>SWITCHES,</u> S. P. S. T.; p/o R 1
S 2	40A80248	Toggle: S. P. D. T.; used only on (-C2) 2-freq. models
	or 40K811753	Toggle: S. P. D. T.; used only on (-C2) 2-freq. models
TB 1	31B893462	<u>BOARDS,</u> Terminal: 27 female contacts; soldering lug type
TB 2	31A890699	Terminal: 6 screw terminals
XI 1	60A890181	<u>LIGHTS,</u> Indicator: miniature single contact bayonet base; RED lens
XI 2	60K890479	Indicator: miniature single contact bayonet base; GREEN lens

2. Optional Accessories

a. P-278-F Handset Microphone

HS 101	1V84353	<u>HANDSET and CABLE ASSEMBLY,</u> Consisting of: 59B80214 HANDSET: carbon; transmitter cartridge, 30 ohm; receiver cartridge 137 ohm at 1000 cycles or 59K834032 HANDSET: carbon; transmitter cartridge 30 ohm; receiver cartridge 137 ohm at 1000 cycles Includes reference part W 101
P 101	28A16370	<u>CONNECTOR,</u> Plug: male; 4 contact; polarized; cylindrical; cable mounted; p/o W 101

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
W 101	1V84354	<u>HANDSET CABLE ASSEMBLY,</u> Includes: 30K84270 CORD, handset; coiled; 5 conductor; conductors color coded; BLACK, WHITE, RED, GREEN, BLUE; both ends of cord are stripped only Includes reference part P 101
NON-REFERENCED PARTS LIST		
	51B83300 1V83301	<u>PHONE HANGER ASSEMBLY</u> <u>PHONE HANGER MOUNTING</u> <u>PARTS ASSEMBLY,</u> includes: 64A83334 PLATE, reinforcing; 3S7453 SCREW, tapping; #8 x 1"; 2 supplied 3S6943 SCREW, machine: 8-32 x 1-1/4"; 2 supplied 4S8411 LOCKWASHER, internal: #8; 2 supplied
b. TU343 Military Microphone P-7255-A Military Microphone (Noise Cancelling)		
MK 201	50K844801 or 1V475678	<u>MICROPHONE,</u> Carbon: push-to-talk switch; Military type; includes reference parts P 201 and W 201 (30B822726) (Used only for model TU343 <u>MICROPHONE and CONNECTOR ASSEMBLY,</u> includes: 59B475596 MICROPHONE, carbon; single button; Military type; push-to-talk switch Includes reference parts W 201 (Assembly used only for model P-7255-A)
P 201	28A16370	<u>CONNECTOR,</u> Plug: male; 4 contact; polarized; cylindrical; cable mounted; p/o MK 201
W 201	30B84269 or 30B822726	<u>CORD,</u> Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord are stripped only; p/o MK 201 (59B475596) used only in model P-7255-A Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord stripped only; p/o MK 201 (50K844801) used only in model TU343
NON-REFERENCED PARTS LIST		
	1V16241	<u>MICROPHONE MOUNTING</u> <u>PARTS KIT,</u> includes: 64A85596 PLATE, support 3S8101 SCREW, tapping; 8-15 x 1/2"; 2 supplied

CONTROL HEAD

TYPE NO.	CONTROL HEAD Description and Application
TU288A	Single-frequency transmitter-receiver control. Includes military type microphone with coiled cord and hang-up clip; with speaker "L" pad volume control.
TU288A-C2	Two-frequency transmitter and/or receiver control. Includes military type microphone with coiled cord and hang-up clip; with speaker "L" pad volume control.
TU287A	Single-frequency transmitter-receiver control, detachable microphone provision, less microphone; with speaker "L" pad volume control.
TU287A-C2	Two-frequency transmitter and/or receiver control, detachable microphone provision, less microphone; with speaker "L" pad volume control.

1. DESCRIPTION

a. Control Head with Military Microphone

The TU288 Series Control Heads with microphones are designed to provide complete dash-mounted control facilities for a mobile transmitter and/or receiver installation. These units feature self-contained junction facilities for control cable, speaker and microphone connections. Mechanical design allows versatile mounting with adjustable angle provisions for easy access to the controls.

b. Control Head with Detachable Microphone

The TU287 Series Control Heads provide identical control facilities as the TU288 Control Heads respectively. These control heads are unique in the following respects:

(1) A microphone or handset is not supplied.

(2) A 4-prong female microphone receptacle is added to accommodate a detachable type microphone or handset.

The TU343 Military Microphone and the P-278-F Telephone Handset are recommended for use with these control heads. Other microphones may be used as shown on the schematic diagram.

c. Standard Control Head Facilities Include

(1) Adjustable VOLUME control with power "on-off" switch.

(2) Variable SQUELCH control.

(3) Green "Power On-Off" pilot indicator.

(4) Red "Transmit On-Off" pilot indicator.

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All control heads are shipped with 6 volt pilot bulbs installed. For 12 volt operation the 6 volt bulb of the green "power on" indicator assembly must be removed and replaced with 12 volt bulb. The twelve volt bulb is supplied with each 12 volt cable kit or cable conversion kit.

2. MULTIPLE FREQUENCY CONTROL

For multiple frequency operation a frequency selector switch is provided. The standard two-frequency switch facilities provide for selection of either of two channels. In transmitter-receiver models, where both units are of the two-frequency type, the channel selection is simultaneous. For separate selection of transmitter and receiver channels special instructions and switching are required.

3. TRANSMITTER INPUT CONSIDERATIONS

When a control head with military microphone is used, the shielded input lead to the grid of the 1st IDC amplifier on the transmitter must be connected to the POS. 1 tap on the input divider (see applicable transmitter schematic diagram). When a control head with cradle telephone type handset is used, the shielded lead must be connected to POS. 2 on the divider network.

NOTE

If a handset is ordered with mobile equipment incorporating a TU287 Series

Control Head, the transmitter will be wired for handset operation at the factory. If the mobile equipment is ordered without a handset or with the TU343 Military Microphone, the transmitter will be connected for microphone input (POS. 1).

4. VOLUME

A speaker "L" pad control is incorporated in the TU287 and TU288 Series Control Heads. This control adjusts only the audio level to the speaker. This is of importance when a QUIK-CALL unit is employed to prevent the latter unit from possible cut-off.

5. VOLUME ADJUSTMENT

To obtain the desired maximum speaker output make adjustments as follows:

Turn the volume control of control head to extreme clockwise position.

Adjust the VOLUME ADJ. control on the receiver chassis to the maximum volume desired.

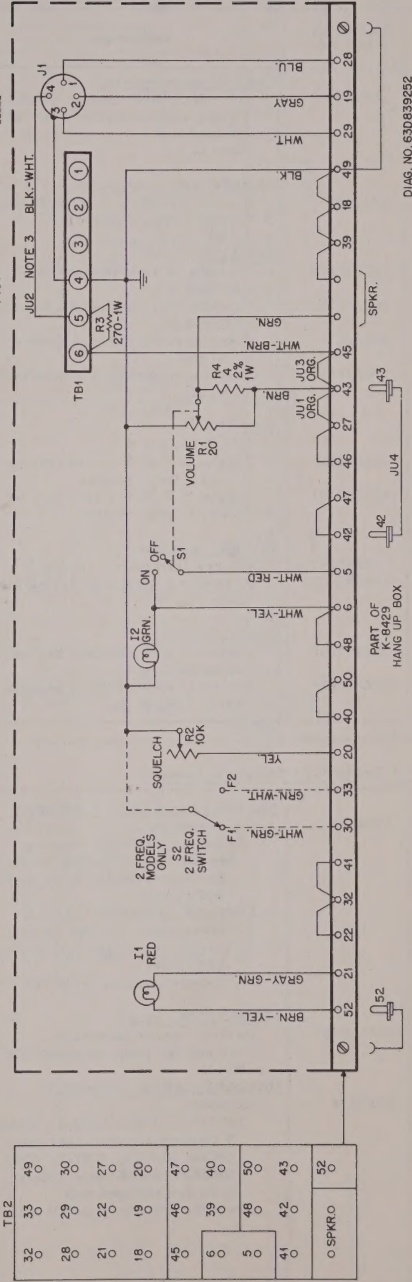
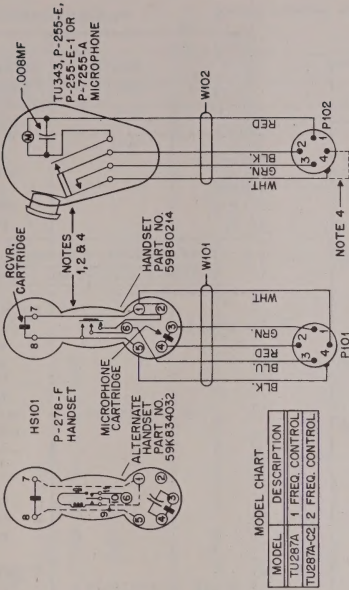
6. APPLICATION DETAILS

When using a handset, QUIK-CALL or hang-up switch box, refer to the jumper table on the applicable control head schematic diagram for specific jumper requirements for each application.

JUMPER TABLE (NOTE 2)

CASE	JU1	JU2	JU3	JU4
1	1 & 2	NOTE 3	USED WITH HANDSET	OMIT
2	OMIT	NOTE 3	OMIT	USED
3	OMIT	NOTE 3	OMIT	OMIT
4	2 & 3	NOTE 3	OMIT	OMIT
5	1 & 2	NOTE 3	USED WITH HANDSET	USE JUMPER INSIDE CONTROL HEAD
6	OMIT	NOTE 3	OMIT	USE JUMPER INSIDE CONTROL HEAD

- NOTES:
- MICROPHONE OR HANDSET ARE NOT PART OF THE CONTROL HEAD AND MUST BE ORDERED SEPARATELY.
 - UNITS SHIPPED WITH JUMPERS CONNECTED FOR SPECIFIED OPERATION. JUMPER CONNECTIONS SHOWN IN THIS SCHEMATIC ARE FOR ONLY ALL JUMPERS EXCEPT JU4 CONNECTED AS SHOWN, ADD OR OMIT JUMPERS AS REQUIRED FOR SPECIFIC OPERATION. (REFER TO TABLE 3 AT LEFT).
 - AT LEFT, CONNECTION AT TB1 DEPENDS UPON MIC (OR HANDSET) USED. FOR TU287A, TU343, P-255-E-1 MIC, CONNECTION IS CORRECT AS SHOWN (AS SHIPPED FROM FACTORY). FOR P-255-E OR P-7255-A, MOVE JU2 TO TERM. 4 OR RE-WIRE MIC PLUG SAME AS P-255-E-1. SEE S8738. DOTTED LEAD TO PIN 4 OF P102 IS USED ON P-255-E (NOT ON P-255-E-1 OR TU343) AND P-7255-A IN PLACE OF CONNECTION TO SHELL OF P102.



DIAG. NO. 63D839252

SCHEMATIC DIAGRAM PARTS LIST

Reference:
Schematic Diagram
63D839252

1. TU287A & TU287A-C2 Series Control Head
w/Microphone Connector

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
I 1	65X4151	<u>LAMPS, incandescent:</u> 6-8 volt; 1 candle power; miniature single contact bayonet base; globe shaped bulb
I 2		Same as I 1
J 1	9B16345	<u>CONNECTOR, receptacle:</u> female; 4 contact; polarized; round chassis mounted base
R 1	18C838283	<u>RESISTOR,</u> Variable: wire-wound; 20 ohm $\pm 20\%$; 2 w
R 2	18C890193	Variable: wire-wound; 10,000 ohm $\pm 10\%$; 2 w
R 3	6R6336	Fixed: carbon; 270 ohm $\pm 10\%$; 1 w; ins.
R 4	17K892469	Fixed: wire-wound; 4 ohm $\pm 2\%$; 1 w; ins.
S 1		<u>SWITCH,</u> S. P. S. T.; p/o R 1
S 2	40A80248	Toggle: S. P. D. T.; used only on (-C2) 2-freq. models
or	40K811753	Toggle: S. P. D. T.; used only on (-C2) 2-freq. models
TB 1	31A890699	<u>BOARD, terminal:</u> 6 screw terminals
TB 2	31B893462	27 female contacts; soldering lug type
XI 1	60A890181	<u>LIGHT, indicator:</u> miniature single contact bayonet base; RED lens
XI 2	60K890479	miniature single contact bayonet base; GREEN lens

2. Optional Accessories

a. P-278-F Cradle-type Telephone Handset

HS 101	1V84353	<u>HANDSET and CABLE ASSEMBLY,</u> Consisting of: 59B80214 HANDSET: carbon; transmitter cartridge, 30 ohm; receiver cartridge 137 ohm at, 1000 cycles or 59K834032 HANDSET: carbon; transmitter cartridge 30 ohm; receiver cartridge 137 ohm at 1000 cycles Includes reference part W 101
P 101	28A16370	<u>CONNECTOR, plug:</u> male; 4 contact; polarized; cylindrical; cable mounted; p/o W 101
W 101	1V84354	<u>HANDSET CABLE ASSEMBLY,</u> Includes: 30K84270 CORD, handset; coiled; 5 conductor; conductors color coded; BLACK, WHITE, RED, GREEN, BLUE; both ends of cord are stripped only Includes reference part P 101

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
NON-REFERENCED PARTS LIST		
	51B83300 1V83301	PHONE HANGER ASSEMBLY PHONE HANGER MOUNTING PARTS ASSEMBLY, includes: 64A83334 PLATE, reinforcing 3S7453 SCREW, tapping: #8 x 1"; 2 supplied 3S6943 SCREW, machine: 8-32 x 1-1/4"; 2 supplied 4S8411 LOCKWASHER, internal: #8; 2 supplied

b. TU343 Military Microphone

P-7255-A Military Microphone (Noise Cancelling)

MK 201	50K844801	<u>MICROPHONE,</u> Carbon: push-to-talk switch; Military type; includes reference parts P 201 and W 201 (30B822726) (Used only for Model TU343)
or	1V475678	MICROPHONE and CONNECTOR ASSEMBLY, Includes: 59B475596 MICROPHONE, carbon; single button; Military type; push-to-talk switch; Includes reference parts W 201 (Assembly used only for model P-7255-A)
P 201	28A16370	<u>CONNECTOR,</u> Plug: male; 4 contact; polarized; cylindrical; cable mounted; p/o MK 201
W 201	30B84269	<u>CORD, microphone:</u> coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord are stripped only; p/o MK 201 (59B475596) used only in Model P-7255-A
or	30B822726	coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord stripped only; p/o MK 201 (50K844801) used only in Model TU343

NON-REFERENCED PARTS LIST

	1V16241	<u>MICROPHONE MOUNTING PARTS KIT,</u> Includes: 64A85596 PLATE, support 3S8101 SCREW, tapping: 8-15 x 1/2"; 2 supplied
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JUMPER TABLE (NOTE 1)

	JU1	JU3	JU4
BASIC OPERATION. SPEAKER IN CIRCUIT AT ALL TIMES. QUIK-CALL AND HANG-UP SWITCH BOX NOT USED.	USED	USED	OMIT
QUIK-CALL WITH HANG-UP BOX. SPEAKER NOT MUTED WHEN MICROPHONE IS IN USE. SPEAKER MUTED WHEN MICROPHONE IS HUNG UP. SPEAKER SWITCHED IN CIRCUIT WHEN QUIK-CALL CODE IS RECEIVED.	OMIT	USED	OMIT
QUIK-CALL FOR ALARM PURPOSES. HANG-UP BOX NOT USED. SPEAKER NOT MUTED AT ANY TIME.	USED	USED	USED

MODEL	DESCRIPTION
TU288A	ONE FREQUENCY
TU288A-C2	TWO FREQUENCY

NOTES:

1. REFER TO JUMPER TABLE FOR USE OF JUMPERS.
2. UNIT SHIPPED WITH JUMPERS CONNECTED FOR SPECIFIED OPERATION. ADD OR OMIT JUMPERS WHERE NECESSARY FOR NEW APPLICATION. (SEE TABLE)
3. S2 AND ASSOCIATED DOTTED LEADS ARE USED ON 2 FREQ. CONTROL HEADS ONLY.
4. UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE IN OHMS $\pm 10\%$, $1/2$ WATT. K = 1000 OHMS.

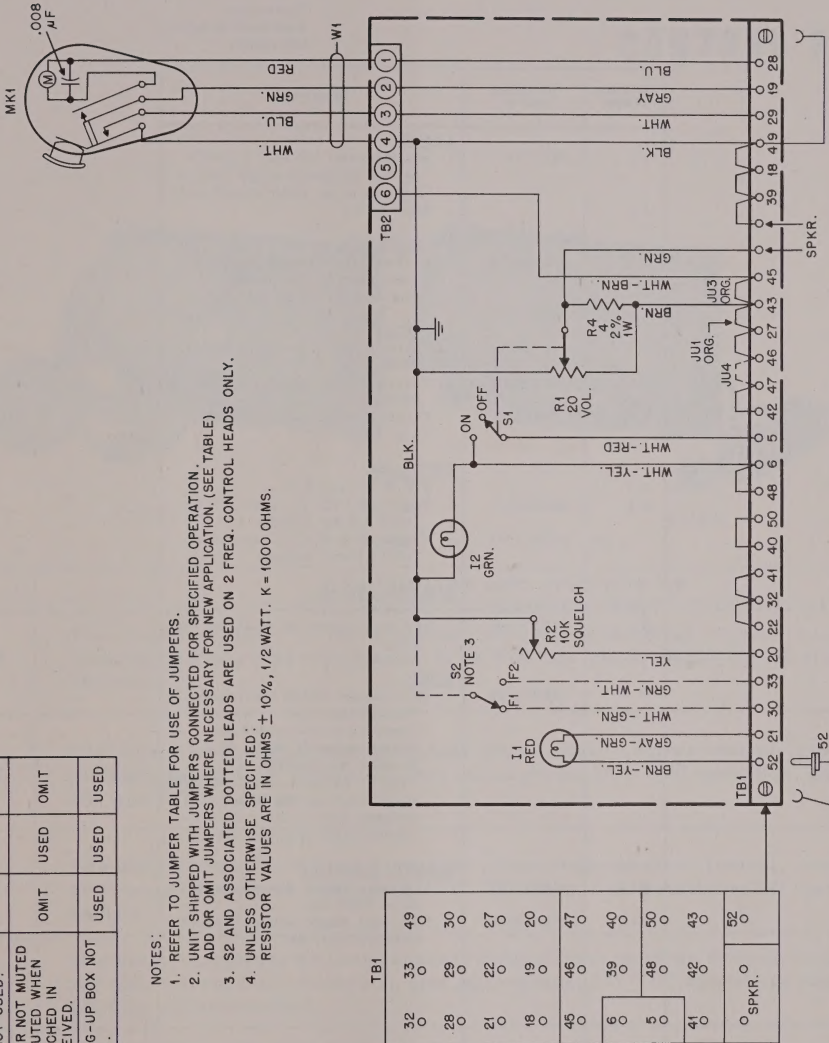


DIAGRAM NO. 63D839253

SCHEMATIC DIAGRAM PARTS LIST

TU288A & TU288A-C2 Series Control Head and Microphone

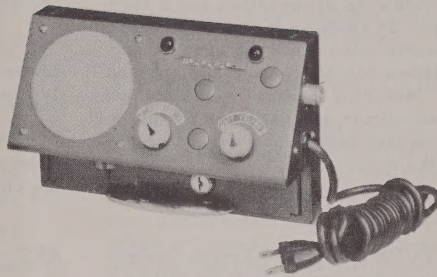
Reference:
Schematic Diagram
63D839253

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
I 1	65X4151	<u>LAMPS.</u> Incandescent; 6-9 volt; 1 candle power; miniature single contact bayonet base; globe shaped bulb
I 2		Same as I 1
MK 1	50D844798	<u>MICROPHONE.</u> Carbon; single button; military type; push-to-talk switch; includes reference part W 1
R 1	18C838283	<u>RESISTOR.</u> Variable; wire-wound; 20 ohm $\pm 20\%$; 2 w
R 2	18C890193	Variable; wire-wound; 10,000 ohm $\pm 10\%$; 2 w
R 3	17K892469	Fixed; wire-wound; 4 ohm $\pm 2\%$; 1 w; ins.
S 1		<u>SWITCHES.</u> S.P.S.T.; p/o R 1
S 2	40A80248	Toggle; S.P.D.T.; used only on (-C2) 2-freq. models
or	40K811753	Toggle; S.P.D.T.; used only on (-C2) 2-freq. models
TB 1	31A890699	<u>BOARDS, terminal:</u> 6 screw terminals
TB 2	31B893462	27 female contacts; soldering lug type
W 1	30B891505	<u>CORD.</u> Microphone; coiled cord; tinsel; 4 conductor; rubber covered; conductors color coded and numbered bands; RED, #1; BLACK, #2; GREEN, #3; WHITE, #4; each conductor with spade terminal lug on one end; stripped only on other end; includes strain clip; p/o MK 1
XI 1	60A890181	<u>LIGHTS, indicator:</u> Miniature single contact bayonet base; RED lens
XI 2	60K890479	Miniature single contact bayonet base; GREEN lens

CONTROL PANELS



TU190



TU208

MODEL	DESCRIPTION AND APPLICATION
TU190 TU190-C2	For single-frequency or two-frequency transmitter-receiver control, respectively; includes military type microphone; 6/12 VDC operation; employing DC type volume control.
TU206 TU206-C2	For single-frequency or two-frequency transmitter-receiver control, respectively; includes microphone connector, less microphone; 6/12 VDC operation; employing DC type volume control.
TU207 TU207-C2	For single-frequency or two-frequency transmitter-receiver control, respectively; includes military type microphone; 117 VAC operation; employing DC type volume control.
TU208 TU208-C2	For single-frequency or two-frequency transmitter-receiver control, respectively; includes microphone connector, less microphone; 117 VAC operation; employing DC type volume control.
TU238	For single-frequency transmitter-receiver control; includes microphone connector, less microphone; 6/12 VDC operation; includes connections for QUIK-CALL application; employing speaker "L" pad control.
TU239	For single-frequency transmitter-receiver control; includes microphone connector, less microphone; 117 VAC operation; includes connections for QUIK-CALL application; employing speaker "L" pad control.

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1. DESCRIPTION

Control panels for front mount mobile and AC utility stations are designed to mount to the radio equipment assembly and are fastened to the equipment housing by means of a key lock. All Control Panels incorporate the following controls: power ON-OFF switch, speaker VOLUME CONTROL, SQUELCH control, "power on" indicator lamp and "transmitter on" indicator lamp. Two-frequency (-C2) models also include a frequency selector switch. The controls, speaker and indicator lamps are mounted on a slanted section of the panel to provide ease of operation and a high degree of visibility. In addition to the operational controls, the panels also mount a speaker and termination facilities for the power and antenna lead-in cables. Metering ports, which permit entrance to the transmitter and receiver metering receptacles, are located under snap covers on the lower section of the control panel.

a. DC Models

The TU190, TU206 and TU238 Series Control Panels are designed for operation from either a 6 or 12 VDC primary power source in front mounting mobile installations. TU190 Series Control Panels are supplied with an attached military type microphone. The TU206 Series include a four-pin receptacle for connection of a detachable microphone or handset. The TU238 Control Panel is the same as the TU206 except for replacing the DC type volume control with a speaker "L" pad and the addition of QUIK-CALL connectors. The detachable microphone or handset must be ordered separately. Two-frequency (-C2) models are available in each group. Refer to Schematic Diagrams 63C835296 (TU190 Series), 63C835297 (TU206 Series) and 63D836033 (TU238) for circuit details.

b. AC Models

The TU207, TU208 and TU239 Series Control Panels are specifically designed for 117 VAC operation in fixed AC utility installations. These panels are similar to the TU190, TU206 and TU238 Series respectively, except that they operate from a 117 volt, 60 cycle primary power source. Refer to Schematic Diagrams 63C835266 (TU207 Series), 63C835267 (TU208 Series) and 63D836034 (TU239 Series) for circuit details.

2. MULTIPLE FREQUENCY CONTROL

For multiple frequency operation of transmitter-receiver models, a frequency selector

switch is provided. The standard two-frequency switch facilities provide for selection of either of two channels. Where transmitter and receiver are two-frequency, the channel selection is simultaneous. For separate selection of transmitter and receiver channels, special cabling is required.

3. SERVICE NOTES

a. Removal of Control Panel

(1) Disconnect the power and antenna lead-in cables (also hang-up switch box and QUIK-CALL cables, if used).

(2) Insert the key in the lock located in the lower section of the control panel and turn the key 1/4 turn clockwise.

(3) Slide the chassis assembly out of the housing far enough to permit access to the rear of the control panel.

(4) Disconnect the antenna cable from the ANT. connector on the transmitter chassis.

(5) Remove the two Phillips head screws located on the top edge of the control panel.

(6) Remove the two Phillips head screws on the side of the control panel near the bottom.

(7) Carefully pull the control panel straight out to avoid damage to the leads connected to the power supply chassis.

CAUTION: The panel is now supported only by its leads.

(8) Snap the rubber grommet out of the hole in the front plate of the chassis mounting kit and pull the antenna lead-in through the hole.

(9) For complete removal or replacement, unsolder the leads at the power supply.

b. Mounting the Control Panel on the Chassis Assembly

(1) Route the antenna cable from the control panel through the rubber grommet provided in the front plate of the chassis assembly.

(2) Solder the leads from the control panel to the power supply as shown on the intercabling diagram if the control panel has been removed or is being replaced.

(3) Fasten the control panel to the chassis assembly.

(a) Insert the two Phillips head screws through the mounting holes at the top edge of the control panel and tighten securely.

(b) Insert the two Phillips head screws (one at each side) in the side edges of the control panel and tighten securely.

(4) Connect the antenna cable extending from the back of the control panel to the ANT. connector on the transmitter chassis.

(5) Connect the hang-up switch box and QUIK-CALL cables if used.

(6) Slide the chassis assembly into the housing and lock in place by turning the key 1/4 turn counterclockwise.

(7) Connect the power and antenna lead-in cables to the control panel.

c. Mounting the Microphone (or Handset) Bracket

(1) The TU190 and TU207 Series Control Panels include a microphone hang-up bracket mounted under the Phillips head screw at the top left edge of the control panel.

(2) The TU206, TU208, TU238, and TU239 Series Control Panels ("less microphone" models) are not supplied with microphone or handset hang-

up facilities. However, the MOTOROLA TU343 Military Microphone, P-7255-A Noise Cancelling Microphone and P-278-F Handset, which are recommended for use with these panels, do include applicable hang-up facilities. To mount the hang-up bracket, use the bracket as a template to locate the mounting holes, and fasten to the appropriate surface with the two sheet metal screws supplied. For mobile installations, the hang-up bracket is generally mounted to the vehicle dash board; for AC utility applications, the bracket may be mounted under the Phillips head screw at the top left edge of the control panel.

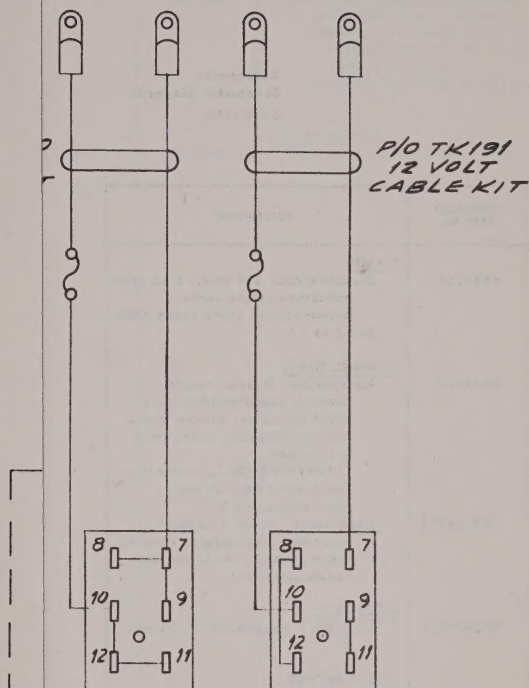
4. TRANSMITTER INPUT CONSIDERATION

When a control panel with military microphone is used, the shield input lead to the grid of the 1st IDC amplifier on the transmitter must be connected to the Pos. 1 tap on the input divider (see applicable transmitter schematic diagram). When a control panel with handset is used, the shielded lead must be connected to Pos. 2 on the divider network.

NOTE

If a handset is ordered with a mobile station incorporating a TU206 Series, TU208, TU238 or TU239 Control Panel, the transmitter will be wired for handset operation at the factory. If the mobile station is ordered without a handset, or with either a military or noise cancelling type microphone, the transmitter will be connected for microphone input.

TU190 SERIES CONTROL PANELS
SCHEMATIC DIAGRAM



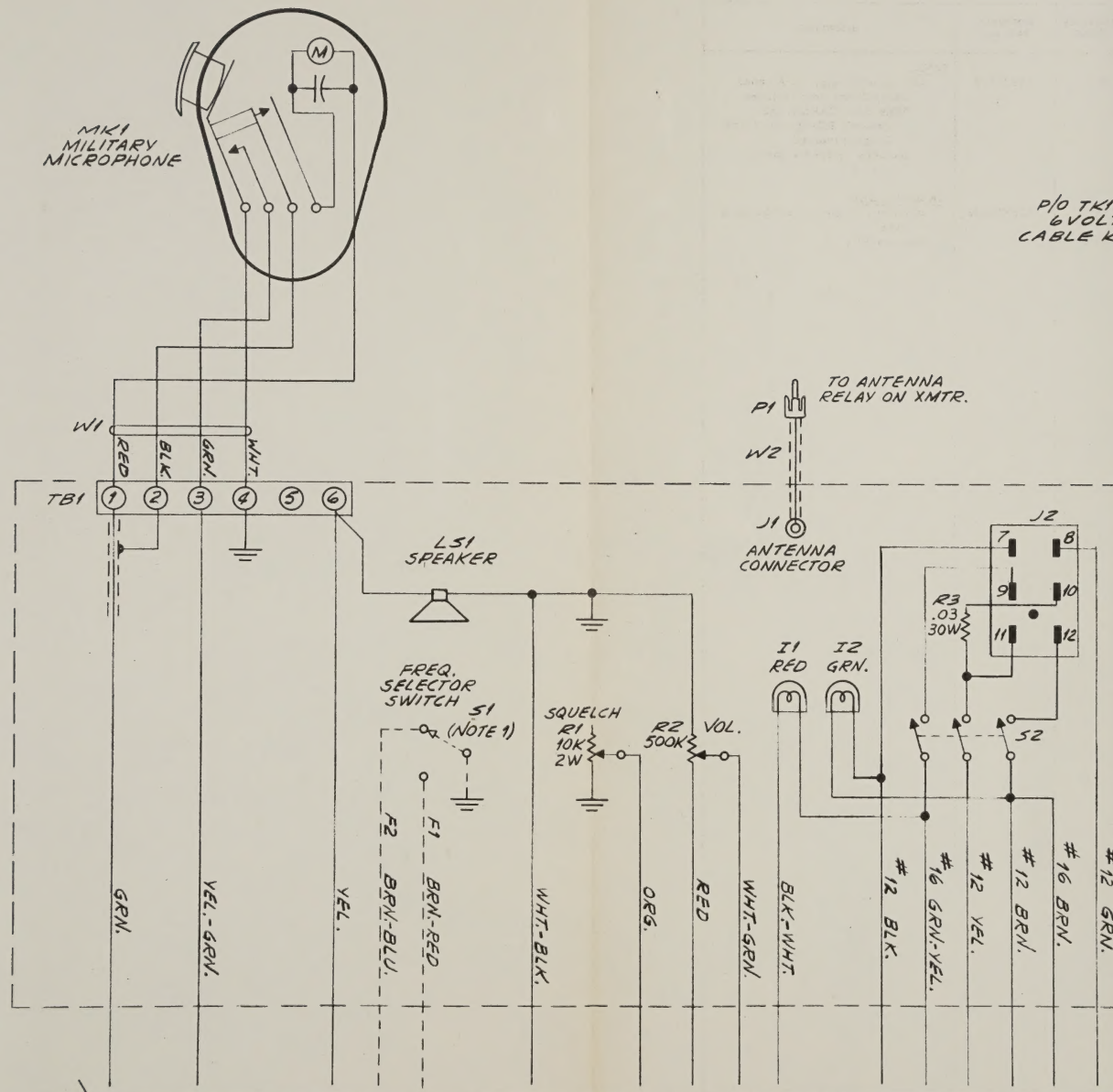
MODEL DESCRIPTION - CONTROL PANELS

MODEL	CHANNELS	OPERATING VOLTAGE
TU190	1 FREQUENCY	6.3 OR 12.6 VDC
TU190-C2	2 FREQUENCY	6.3 OR 12.6 VDC

NOTES:

1. FREQUENCY SELECTOR SWITCH AND LEADS USED ONLY IN TU190-C2.
2. CONNECTORS ARE VIEWED FROM THE WIRING SIDE.

63C835296



REFER TO INTERCABLING DIAGRAM FOR CONNECTIONS TO POWER SUPPLY CHASSIS

P/O TK190
6VOLT
CABLE KIT

P/O TK191
12 VOLT
CABLE KIT

MODEL DESCRIPTION - CONTROL PANELS

MODEL	CHANNELS	OPERATING VOLTAGE
TU190	1 FREQUENCY	6.3 OR 12.6 VDC
TU190-C2	2 FREQUENCY	6.3 OR 12.6 VDC

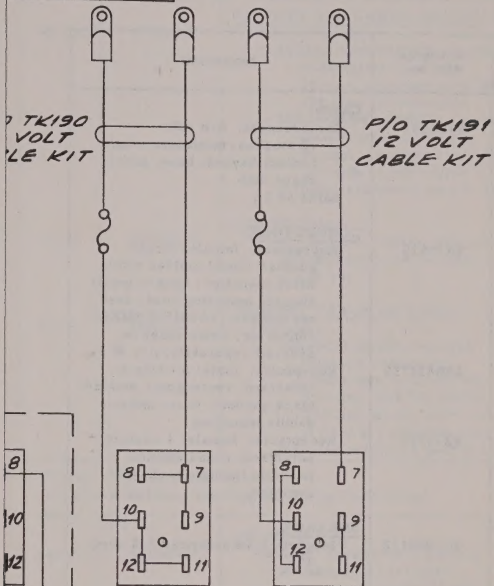
NOTES:
1. FREQUENCY SELECTOR SWITCH AND LEADS USED ONLY IN TU190-C2.
2. CONNECTORS ARE VIEWED FROM THE WIRING SIDE.

63C835296

TU206 SERIES CONTROL PANELS SCHEMATIC DIAGRAM

GRAM IS APPLICABLE AS DRAWN TO THE
ACTION VERSION INDICATED BY SUFFIX
THE TABLE IT IS APPLICABLE TO EACH
ACTION VERSION WHEN AMENDED BY ALL
ETINGS LISTED FOR SUCCEEDING VERSIONS.

MODIFYING SERVICE BULLETIN NUMBERS									
									738
DISCONTINUED VERSIONS									LATEST VERSION
									-1



MODEL DESCRIPTION-CONTROL PANELS

MODEL	CHANNELS	OPERATING VOLTAGE
TU206	1 FREQUENCY	6.3 OR 12.6 VDC
TU206-C2	2 FREQUENCY	6.3 OR 12.6 VDC

NOTES:

1. FREQUENCY SELECTOR SWITCH AND LEADS USED ONLY IN TU206-C2.
2. JUI CONNECTION AT TB2 DEPENDS UPON MIC. (OR HANDSET) USED. FOR ALL HANDSETS, P-255-E-1 & TU343 MIL. MICS. CONNECTION IS CORRECT AS SHOWN (AS SHIPPED FROM FACTORY). FOR P-255-E OR P-7255-A MOVE JUI TO TERM. A OR RE-WIRE MIC. PLUG SAME AS P-255-E-1. SEE SB 738.
3. MICROPHONE OR HANDSET IS NOT PART OF THE CONTROL PANEL AND MUST BE ORDERED SEPARATELY.
4. CONNECTORS ARE VIEWED FROM THE WIRING SIDE.
5. DOTTED LEAD TO PIN 4 OF P201 IS USED ON P-255-E (NOT P-255-E-1 OR TU343) AND P-7255-A IN PLACE OF CONNECTION TO SHELL OF P201.

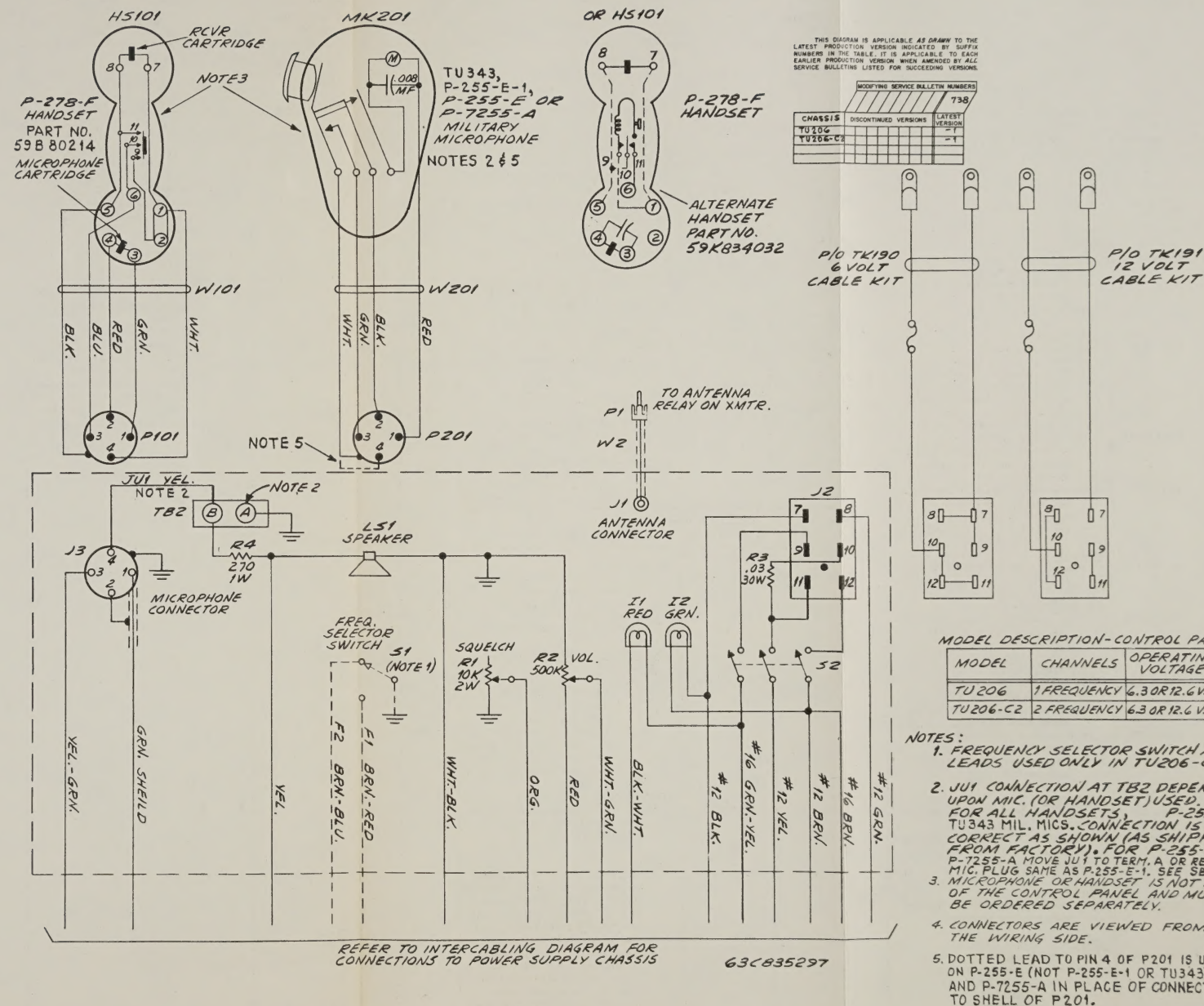
SCHEMATIC DIAGRAM PARTS LIST

TU190 Speaker and Control Panel (DC) 1-Freq.
 TU190-C2 Speaker and Control Panel (DC) 2-Freq.

Reference:
 Schematic Diagram
 63C835296

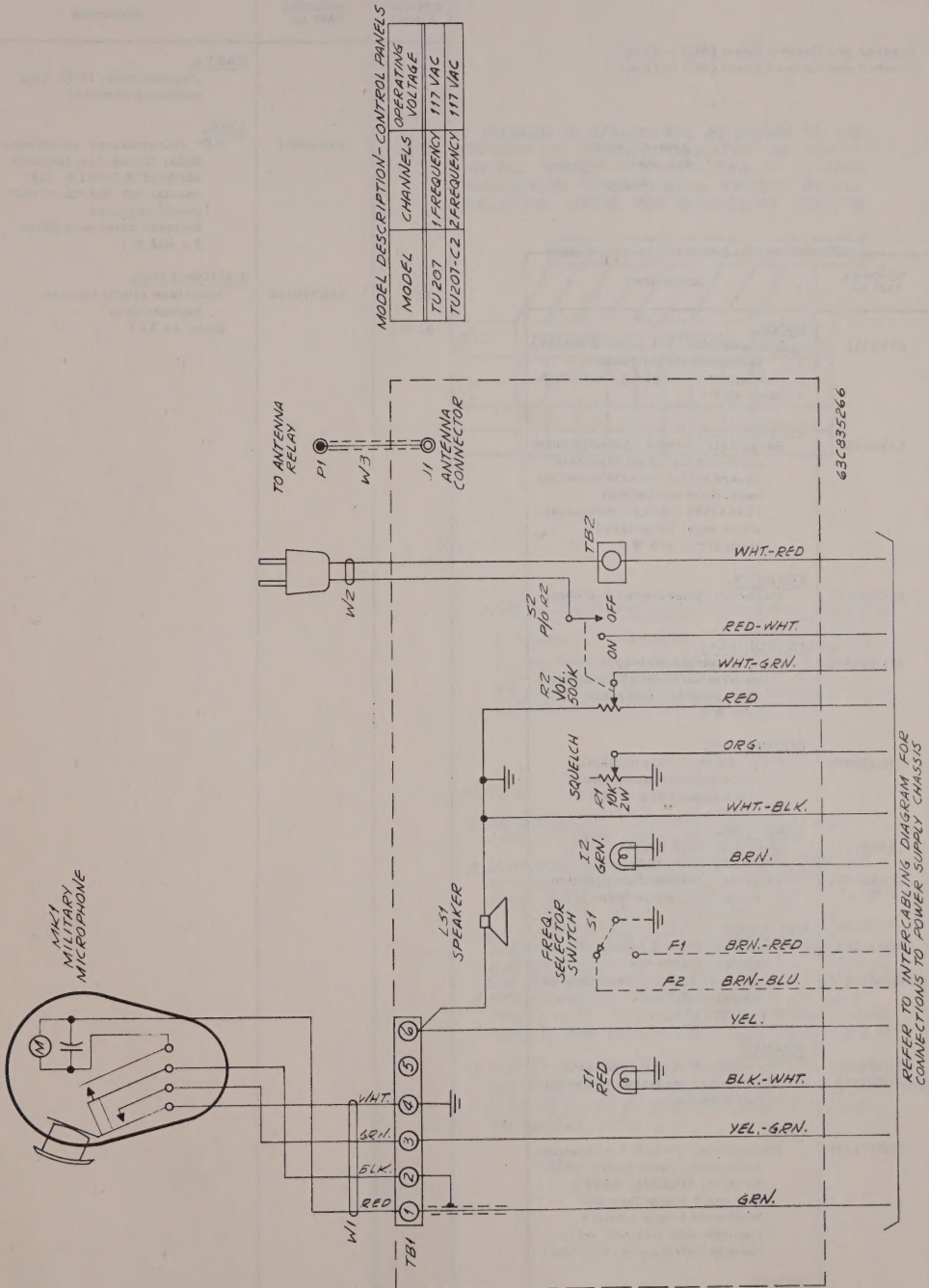
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
I 1	65X4151	<u>LAMP,</u> Incandescent: 6-8 volt; .2 ampere; miniature single contact bayonet base; globe shape bulb
I 2		Same as I 1
J 1	9A85615	<u>CONNECTORS,</u> Receptacle: female; single contact; round molded mica filled insulator; square metal chassis mounting base; does not include 15A483599 SHELL, connector; which must be ordered separately; p/o W 2
J 2	28B834755	Receptacle: male; 6 contact; polarized; rectangular molded black phenolic base; chassis saddle mounting
LS 1	50C800112	<u>SPEAKER,</u> Magnetic: impedance, 3.2 ohm; 4"
MK 1	50D844798	<u>MICROPHONE,</u> Carbon: single button; push-to-talk switch; military type; includes reference part W 1
P 1	28K474006	<u>CONNECTOR,</u> Plug: male; single contact; round bakelite wafer base; cable mounted; p/o W 2
R 1	18A890193	<u>RESISTORS,</u> Variable: wire-wound; 10,000 ohm $\pm 10\%$; 2 W
R 2	18A822378	Variable: carbon; 500,000 ohm $\pm 10\%$; 2.25 W; max.
R 3	17B834758	Fixed: wire-wound; .03 ohm $\pm 10-15\%$; 30 W; ins.
S 1	40A80248 or 40K811824	<u>SWITCHES,</u> Toggle: S.P.D.T.; used only in Model TU190-C2
S 2	40B834757	Toggle: S.P.D.T.; used only in Model TU190-C2
TB 1	31A890699	<u>BOARD,</u> Terminal: 6 screw terminals
W 1	30B891505	<u>CORD,</u> Microphone: coiled; 4 conductor; conductors color coded RED, BLACK, GREEN, WHITE; one end 4 spade lugs and numbered bands 1 thru 4, opposite end stripped only; includes strain clip; p/o MK 1

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
W 2	1V836807	<u>LINE,</u> RF: transmission; to Antenna Relay Connector; includes 30K475378 CABLE, RF; coaxial; RG-58A/U; 7-1/2" length required Includes reference parts J 1, P 1
XI 1	60K890182	<u>LAMPHOLDER,</u> Miniature single contact bayonet base
XI 2		Same as XI 1



MOTOROLA PART No.	DESCRIPTION
NON-REFERENCED PARTS LIST	
1V16241	<u>MICROPHONE MOUNTING</u> <u>PARTS KIT,</u> Supplied with Models TU343 and P-7255-A; includes: 64A85596 PLATE, support 3S8101 SCREW, tapping: 8-15 x 1/2"; 2 supplied
51B83300	<u>PHONE HANGER ASSEMBLY,</u> Supplied with Model P-278-F; requires 1V83301 MOUNTING PARTS KIT
1V83301	<u>PHONE HANGER MOUNTING</u> <u>PARTS KIT,</u> Supplied with Model P-278-F; used with 51B83300 PHONE HANGER ASSEMBLY; includes: 64A83334 PLATE, reinforcing 3S7453 SCREW, tapping: #8 x 1"; 2 supplied 3S6943 SCREW, machine: 8-32 x 1-1/4"; 2 supplied 4S8411 LOCKWASHER, internal: #8; 2 supplied
60K890184 60K890588	<u>LENS,</u> Indicator light: RED Indicator light: GREEN

TU207 SERIES CONTROL PANELS SCHEMATIC DIAGRAM



SCHEMATIC DIAGRAM PARTS LIST

Reference:
Schematic Diagram
63C835297

1. TU206 Speaker and Control Panel (DC) 1-Freq.
(With Mic. Connector)
TU206-C2 Speaker and Control Panel (DC) 2-Freq.
(With Mic. Connector)

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
I 1	65X4151	<u>LAMP,</u> Incandescent: 6-8 volt; .2 ampere; miniature single contact bayonet base; globe shape bulb Same as I 1
I 2		
J 1	9A85615	<u>CONNECTORS,</u> Receptacle: female; single contact; round molded mica filled insulator; square metal chassis mounting base; does not include 15A483599 SHELL, connector; which must be ordered separately; p/o W 2
J 2	28B834755	Receptacle: male; 6 contact; polarized; rectangular molded black phenolic base; chassis saddle mounting
J 3	9B16345	Receptacle: female; 4 contact; polarized; round molded phenolic insulator; chassis mounted
LS 1	50C800112	<u>SPEAKER,</u> Magnetic: impedance, 3.2 ohm; 4"
P 1	28K474006	<u>CONNECTOR,</u> Plug: male; single contact; round bakelite wafer base; cable mounted; p/o W 2
R 1	18A890193	<u>RESISTORS,</u> Variable: wire-wound; 10,000 ohm $\pm 10\%$; 2 W
R 2	18A822378	Variable: carbon; 500,000 ohm $\pm 10\%$; 2.25 W; max.
R 3	17B834758	Fixed: wire-wound; .03 ohm $\pm 10-15\%$; 30 W; ins.
R 4	6R6336	Fixed: carbon; 270 ohm $\pm 10\%$; 1 W; ins.
S 1	40A80248 or 40K811824	<u>SWITCHES,</u> Toggle: S.P.D.T.; used only in Model TU206-C2
S 2	40B834757	Toggle: S.P.D.T.; used only in Model TU206-C2
TB 2	31K51251	Toggle: 3P-S.T.
W 2	1V836807	<u>BOARD,</u> Terminal: 1 insulated; 1 ground soldering lug terminals
		<u>LINE,</u> RF: transmission; to Antenna Relay Connector; includes 30K475378 CABLE, RF; coaxial; RG-58A/U; 7-1/2" length required Includes reference parts J 1, P 1

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
XI 1	60K890182	<u>LAMP HOLDERS,</u> Miniature single contact bayonet base
XI 2		Same as XI 1

2. Optional Accessories

a. P-278-F Handset Microphone

HS 101	1V84353	<u>HANDSET AND CABLE ASSEMBLY,</u> Consisting of: 59B80214 HANDSET: carbon; transmitter cartridge, 30 ohm; receiver cartridge 137 ohm at 1000 cycle or 59K834032 HANDSET: carbon; transmitter cartridge, 30 ohm; receiver cartridge 137 ohm at 1000 cycle Includes reference part W 101
P 101	28A16370	<u>CONNECTOR,</u> Plug: male; 4 contact; polarized; cylindrical; cable mounted; p/o W 101
W 101	1V84354	<u>HANDSET CABLE ASSEMBLY,</u> Includes: 30K84270 CORD, handset; coiled; 5 conductor; conductors color coded; BLACK, WHITE, RED, GREEN, BLUE; both ends of cord are stripped only Includes reference part P 101

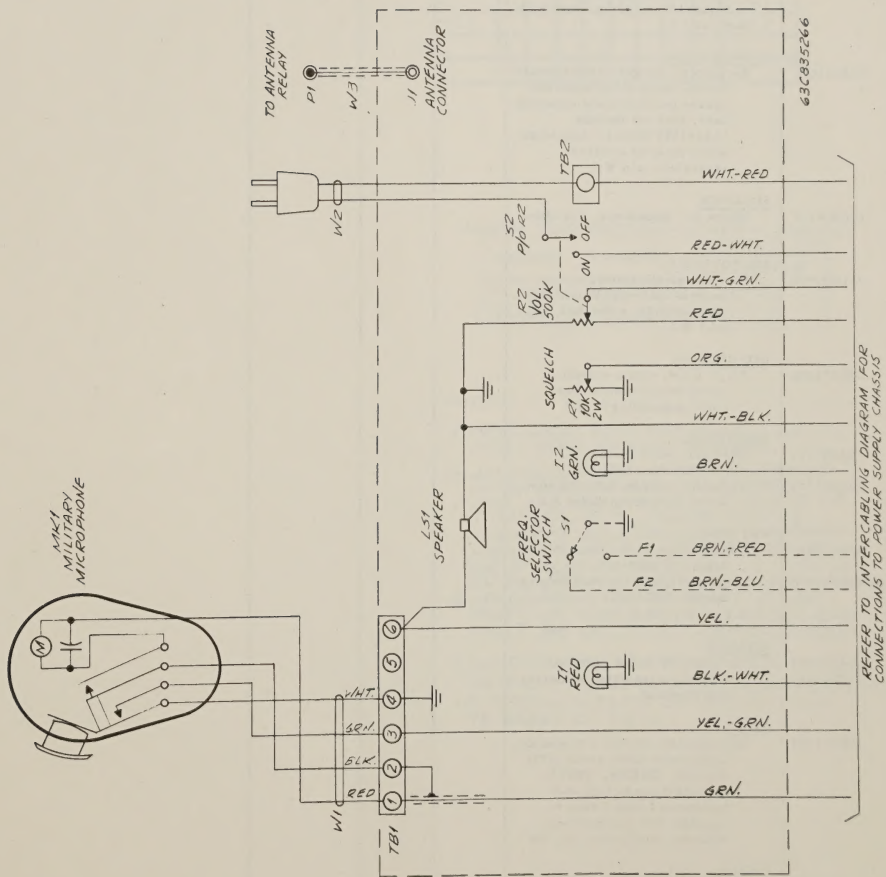
b. TU343 Military Microphone
P-7255-A Military Microphone (Noise Cancelling)

MK 201	50K844801 or 1V475678	<u>MICROPHONE,</u> Carbon: push-to-talk switch; Military type; includes reference parts P 201 and W 201 (30B822726) (Used only for Model TU343)
		<u>MICROPHONE AND CONNECTOR ASSEMBLY,</u> Includes: 59B475596 MICROPHONE, carbon: single button; Military type; push-to-talk switch, includes reference parts W 201 (Assembly used only for Model P-7255-A)
P 201	28A16370	<u>CONNECTOR,</u> Plug: male; 4 contact; polarized; cylindrical; cable mounted; p/o MK 201
W 201	30B84269 or 30B822726	<u>CORD,</u> Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord are stripped only; p/o MK 201 (59B475596) used only in Model P-7255-A
		Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord stripped only; p/o MK 201 (50K844801) Used only in Model TU343

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
NON-REFERENCED PARTS LIST		
1V16241		<u>MICROPHONE MOUNTING PARTS KIT,</u> Supplied with Models TU343 and P-7255-A; includes: 64A85596 PLATE, support 358101 SCREW, tapping; 8-15 x 1/2"; 2 supplied
51B83300		<u>PHONE HANGER ASSEMBLY,</u> Supplied with Model P-278-F; requires 1V83301 MOUNTING PARTS KIT
1V83301		<u>PHONE HANGER MOUNTING PARTS KIT,</u> Supplied with Model P-278-F; used with 51B83300 PHONE HANGER ASSEMBLY; includes: 64A83334 PLATE, reinforcing 357453 SCREW, tapping; #8 x 1"; 2 supplied 356943 SCREW, machine; 8-32 x 1-1/4"; 2 supplied 458411 LOCKWASHER, internal: #8; 2 supplied
60K890184 60K890588		<u>LENS,</u> Indicator light: RED Indicator light: GREEN

MODEL DESCRIPTION-CONTROL PANELS

MODEL	CHANNELS	OPERATING VOLTAGE
TU207	1 FREQUENCY	117 VAC
TU207-C2	2 FREQUENCY	117 VAC



SCHEMATIC DIAGRAM PARTS LIST

TU207 Speaker and Control Panel (AC) 1-Freq.
 TU207-C2 Speaker and Control Panel (AC) 2-Freq.

Reference:
 Schematic Diagram
 63C835266

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
I 1	65X4151	<u>LAMP,</u> Incandescent: 6-8 volt; .2 ampere miniature single contact; bayonet base; globe shape bulb
I 2		Same as I 1
J 1	9A85615	<u>CONNECTORS,</u> Receptacle: single contact; round molded mica filled insulator; square metal chassis mounting base; does not include 15A483599 SHELL, connector; which must be ordered separately; p/o W 3
LS 1	50C800112	<u>SPEAKER,</u> Magnetic: impedance, 3.2 ohm; 4"
MK 1	50D844798	<u>MICROPHONE,</u> Carbon: single button; push-to-talk switch; military type; includes reference part W 1
P 1	28K474006	<u>CONNECTOR,</u> Plug: male; single contact; round bakelite wafer base; cable mounted; p/o W 3
R 1	18A890193	<u>RESISTORS,</u> Variable: wire-wound; 10,000 ohm $\pm 10\%$; 2 W
R 2	18A822301	Variable: carbon; 500,000 ohm $\pm 10\%$; 2.25 W; includes S 2
S 1	40A80248	<u>SWITCHES,</u> Toggle: S. P. D. T.; used only in Model TU207-C2
	or 40K811824	Toggle: S. P. D. T.; used only in Model TU207-C2
S 2		S. P. S. T.; p/o R 2
TB 1	31A890699	<u>BOARDS,</u> Terminal: 6 screw terminals
TB 2	31K85348	Terminal: 1 insulated soldering lug terminal
W 1	30B891505	<u>CORD,</u> Microphone: coiled; 4 conductor; conductors color coded RED, BLACK, GREEN, WHITE; one end 4 spade lugs and numbered bands 1 thru 4, opposite end stripped only; includes strain clip; p/o MK 1
W 2	30B892534	<u>CABLE,</u> Power: molded rubber covered 2 conductor; one end 2 contact male AC connector, other end

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
W 3	1V836807	<u>CABLE,</u> stripped only; 10 ft. long excluding contacts <u>LINE,</u> RF: transmission; to Antenna Relay Connector; includes 30K475378 CABLE, RF: coaxial RG-58A/U; 7-1/2" length required Includes reference parts J 1 and P 1
XI 1	60K890182	<u>LAMPHOLDER,</u> Miniature single contact bayonet base
XI 2		Same as XI 1

S DIAGRAM IS APPLICABLE *AS DRAWN* TO THE PRODUCTION VERSION INDICATED BY SUFFIX IN THE TABLE. IT IS APPLICABLE TO EACH PRODUCTION VERSION WHEN AMENDED BY *ALL* BULLETINS LISTED FOR SUCCEEDING VERSIONS.

MODIFYING SERVICE BULLETIN NUMBERS									
									738
SIS	DISCONTINUED VERSIONS								LATEST VERSION
									-1
-C2									-1

MODEL DESCRIPTION-CONTROL PANELS

MODEL	CHANNELS	OPERATING VOLTAGE
TU208	1 FREQUENCY	117 VAC
TU208-C2	2 FREQUENCY	117 VAC

NOTES:

1. FREQUENCY SELECTOR SWITCH AND LEADS USED ONLY IN TU208-C2.
2. JUI CONNECTION AT TB3 DEPENDS UPON MIC. (OR HANDSET) USED. FOR ALL HANDSETS, P-255-E-1 & TU343 MIL. MICS. CONNECTION IS CORRECT AS SHOWN (AS SHIPPED FROM FACTORY). FOR P-255-E OR P-7255-A MOVE JUI TO TERM A OR RE-WIRE MIC. PLUG SAME AS P-255-E-1. SEE SB 738.
3. MICROPHONE OR HEADSET IS NOT PART OF THE CONTROL PANEL AND MUST BE ORDERED SEPARATELY.
4. DOTTED LEAD TO PIN 4 OF P201 IS USED ON P-255-E (NOT ON P-255-E-1 OR TU343) AND P-7255-A IN PLACE OF CONNECTION TO SHELL OF P201.

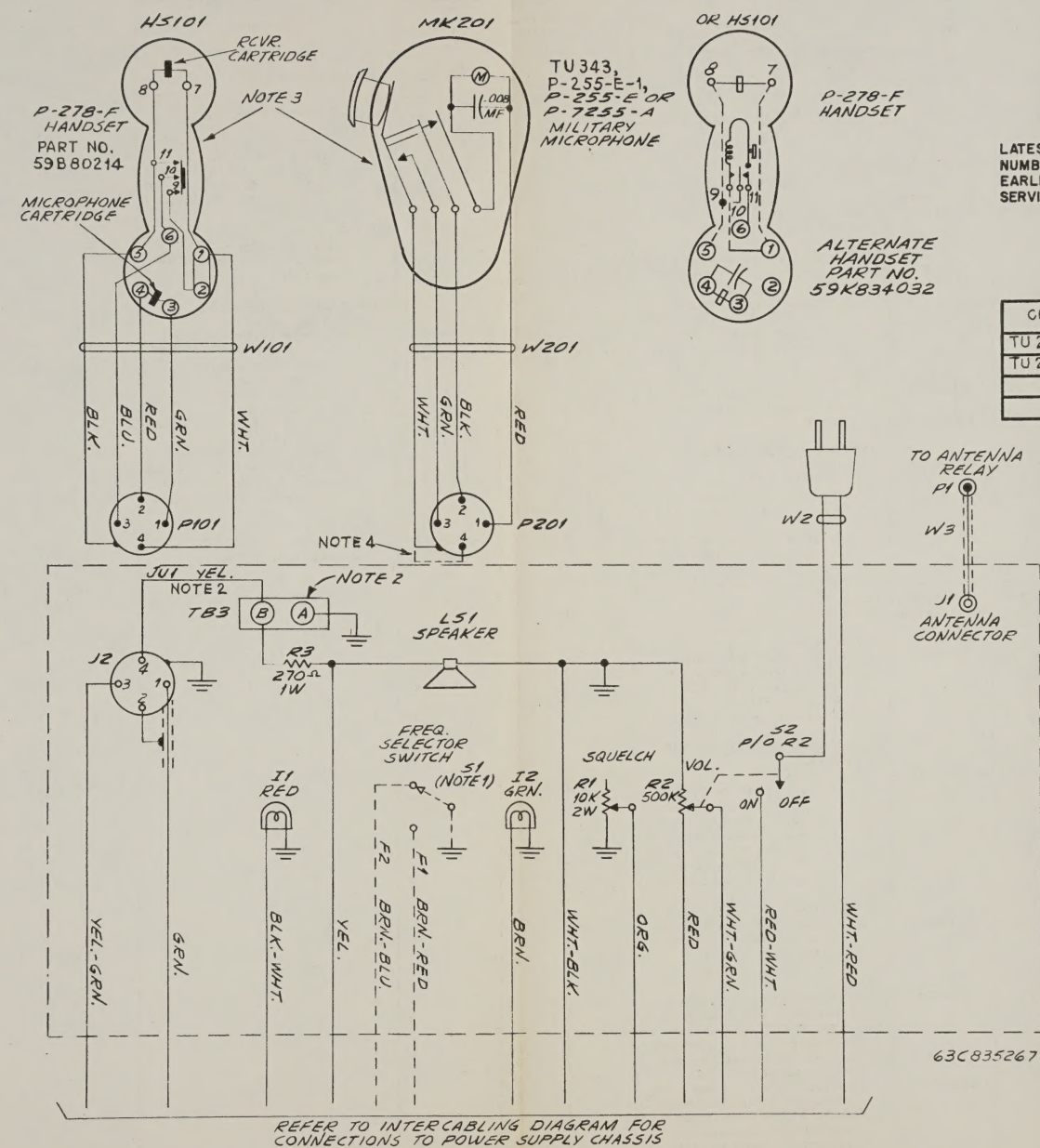
SCHEMATIC DIAGRAM PARTS LIST

TU207 Speaker and Control Panel (AC) 1-Freq.
 TU207-C2 Speaker and Control Panel (AC) 2-Freq.

Reference:
 Schematic Diagram
 63C835266

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
I 1	65X4151	<u>LAMP,</u> Incandescent: 6-8 volt; .2 ampere miniature single contact; bayonet base; globe shape bulb Same as I 1
I 2		
J 1	9A85615	<u>CONNECTORS,</u> Receptacle: single contact; round molded mica filled insulator; square metal chassis mounting base; does not include 15A483599 SHELL, connector; which must be ordered separately; p/o W 3
LS 1	50C800112	<u>SPEAKER,</u> Magnetic: impedance, 3.2 ohm; 4"
MK 1	50D844798	<u>MICROPHONE,</u> Carbon: single button; push-to-talk switch; military type; includes reference part W 1
P 1	28K474006	<u>CONNECTOR,</u> Plug: male; single contact; round bakelite wafer base; cable mounted; p/o W 3
R 1	18A890193	<u>RESISTORS,</u> Variable: wire-wound; 10,000 ohm $\pm 10\%$; 2 W
R 2	18A822301	Variable: carbon; 500,000 ohm $\pm 10\%$; 2.25 W; includes S 2
S 1	40A80248	<u>SWITCHES,</u> Toggle: S. P. D. T.; used only in Model TU207-C2
	or 40K811824	Toggle: S. P. D. T.; used only in Model TU207-C2
S 2		S. P. S. T.; p/o R 2
TB 1	31A890699	<u>BOARDS,</u> Terminal: 6 screw terminals
TB 2	31K85348	Terminal: 1 insulated soldering lug terminal
W 1	30B891505	<u>CORD,</u> Microphone: coiled; 4 conductor; conductors color coded RED, BLACK, GREEN, WHITE; one end 4 spade lugs and numbered bands 1 thru 4, opposite end stripped only; includes strain clip; p/o MK 1
W 2	30B892534	<u>CABLE,</u> Power: molded rubber covered 2 conductor; one end 2 contact male AC connector, other end

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
W 3	1V836807	<u>CABLE,</u> stripped only; 10 ft. long excluding contacts <u>LINE,</u> RF: transmission; to Antenna Relay Connector; includes 30K475378 CABLE, RF: coaxial RG-58A/U; 7-1/2" length required Includes reference parts J 1 and P 1
XI 1	60K890182	<u>LAMPHOLDER,</u> Miniature single contact bayonet base
XI 2		Same as XI 1



THIS DIAGRAM IS APPLICABLE AS DRAWN TO THE LATEST PRODUCTION VERSION INDICATED BY SUFFIX NUMBERS IN THE TABLE. IT IS APPLICABLE TO EACH EARLIER PRODUCTION VERSION WHEN AMENDED BY ALL SERVICE BULLETINS LISTED FOR SUCCEEDING VERSIONS.

MODIFYING SERVICE BULLETIN NUMBERS				
				738
CHASSIS	DISCONTINUED VERSIONS			LATEST VERSION
TU 208				-1
TU 208-C2				-1

MODEL DESCRIPTION-CONTROL PANELS

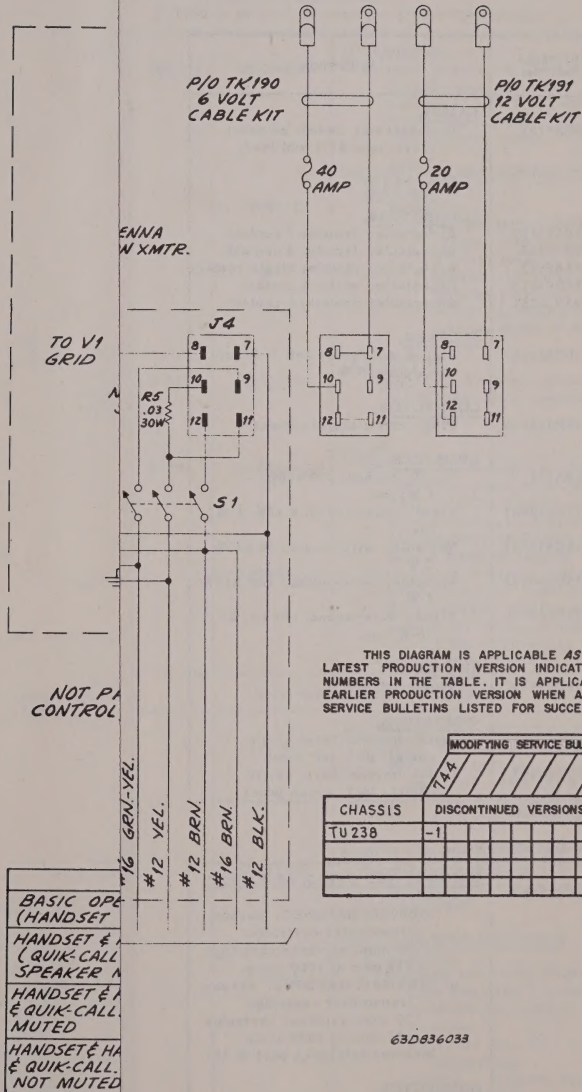
MODEL	CHANNELS	OPERATING VOLTAGE
TU 208	1 FREQUENCY	117 VAC
TU 208-C2	2 FREQUENCY	117 VAC

- NOTES:
1. FREQUENCY SELECTOR SWITCH AND LEADS USED ONLY IN TU208-C2.
 2. JUI CONNECTION AT TB3 DEPENDS UPON MIC. (OR HANDSET) USED. FOR ALL HANDSETS, P-255-E-1 & TU343 MIL. MICS. CONNECTION IS CORRECT AS SHOWN (AS SHIPPED FROM FACTORY). FOR P-255-E OR P-7255-A MOVE JUI TO TERM A OR RE-WIRE MIC. PLUG SAME AS P-255-E-1. SEE SB 738.
 3. MICROPHONE OR HEADSET IS NOT PART OF THE CONTROL PANEL AND MUST BE ORDERED SEPARATELY.
 4. DOTTED LEAD TO PIN 4 OF P201 IS USED ON P-255-E (NOT ON P-255-E-1 OR TU343) AND P-7255-A IN PLACE OF CONNECTION TO SHELL OF P201.

MOTOROLA PART No.	DESCRIPTION
NON-REFERENCED PARTS LIST	
1V16241	<u>MICROPHONE MOUNTING</u> <u>PARTS KIT,</u> Supplied with Models TU343 and P-7255-A; includes: 64A85596 PLATE, support 3S8101 SCREW, tapping: 8-15 x 1/2"; 2 supplied
	<u>PHONE HANGER ASSEMBLY,</u> Supplied with Model P-278-F; requires 1V83301 MOUNTING PARTS KIT
1V83301	<u>PHONE HANGER MOUNTING</u> <u>PARTS KIT,</u> Supplied with Model P-278-F; used with 51B83300 PHONE HANGER ASSEMBLY; includes: 64A83334 PLATE, reinforcing 3S7453 SCREW, tapping: #8 x 1"; 2 supplied 3S6943 SCREW, machine: 8-32 x 1-1/4"; 2 supplied 4S8411 LOCKWASHER, internal: #8; 2 supplied
	<u>LENS,</u> Indicator light: RED Indicator light: GREEN
60K890184 60K890588	

NOTES:

1. YEL. LEAD CONN
USED. FOR ALL
IS CORRECT AS S
OR P-7255-A MO
RE-WIRE MIC. PL
2. MICROPHONE OR
PANEL AND MUS
3. UNIT SHIPPED V
SHOWN FOR CON
4. DOTTED LEAD T
OR TU343) AND
TO SHELL OF P



THIS DIAGRAM IS APPLICABLE *AS DRAWN* TO THE LATEST PRODUCTION VERSION INDICATED BY SUFFIX NUMBERS IN THE TABLE. IT IS APPLICABLE TO EACH EARLIER PRODUCTION VERSION WHEN AMENDED BY *ALL* SERVICE BULLETINS LISTED FOR SUCCEEDING VERSIONS.

MODIFYING SERVICE BULLETIN NUMBERS		
744		738
CHASSIS	DISCONTINUED VERSIONS	LATEST VERSION
TU 238	-1	-2

63D836033

SCHEMATIC DIAGRAM PARTS LIST

Reference:
Schematic Diagram
63C835267

1. TU208 Speaker and Control Panel (AC) 1-Freq.
(With Mic. Connector)
TU208-C2 Speaker and Control Panel (AC) 2-Freq.
(With Mic. Connector)

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
I 1	65X4151	<u>LAMP,</u> Incandescent: 6-8 volt; .2 ampere miniature single contact; bayonet base; globe shape bulb Same as I 1
I 2		
J 1	9A85615	<u>CONNECTORS,</u> Receptacle: single contact; round molded mica filled insulator; square metal chassis mounting base; does not include 15A483599 SHELL, connector; which must be ordered separately; p/o W 3
J 2	9B16345	Receptacle: female; 4 contact; polarized; round molded phenolic insulator; chassis mounted
LS 1	50C800112	<u>SPEAKER,</u> Magnetic: impedance, 3.2 ohm; 4"
P 1	28K474006	<u>CONNECTOR,</u> Plug: male; single contact; round bakelite wafer base; cable mounted; p/o W 3
R 1	18A890193	<u>RESISTORS,</u> Variable: wire-wound; 10,000 ohm $\pm 10\%$; 2 W
R 2	18A822301	Variable: carbon; 500,000 ohm $\pm 10\%$; 2.25 W; includes S 2
R 3	6R6336	Fixed: carbon; 270 ohm $\pm 10\%$; 1 W; ins.
S 1	40A80248 or 40K811824	<u>SWITCHES,</u> Toggle: S.P.D.T.; used only in Model TU208-C2 Toggle: S.P.D.T.; used only in Model TU208-C2
S 2		S.P.S.T.; p/o R 2
TB 3	31K51251	<u>BOARD,</u> Terminal: 1 insulated; 1 ground soldering lug terminals
W 2	30B892534	<u>CABLE,</u> Power: molded rubber covered 2 conductor; one end 2 contact male AC connector, other end stripped only; 10 ft. long excluding contacts
W 3	1V836807	<u>LINE,</u> RF: transmission; to Antenna Relay Connector; includes 30K475378 CABLE, RF; coaxial RG-58A/U; 7-1/2" length required Includes reference parts J 1 and P 1

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
XI 1	60K890182	<u>LAMPHOLDER,</u> Miniature single contact bayonet base Same as XI 1
XI 2		

2. Optional Accessories

a. P-278-F Handset Microphone

HS 101	1V84353	<u>HANDSET AND CABLE ASSEMBLY,</u> Consisting of: 59B80214 HANDSET: carbon; transmitter cartridge, 30 ohm; receiver cartridge 137 ohm at 1000 cycle or 59K834032 HANDSET: carbon; transmitter cartridge, 30 ohm; receiver cartridge 137 ohm at 1000 cycle Includes reference part W 101
P 101	28A16370	<u>CONNECTOR,</u> Plug: male; 4 contact; polarized; cylindrical; cable mounted; p/o W 101
W 101	1V84354	<u>HANDSET CABLE ASSEMBLY</u> Includes: 30K84270 CORD, handset: coiled; 5 conductor; conductors color coded; BLACK, WHITE, RED, GREEN, BLUE; both ends of cord are stripped only Includes reference part P 101

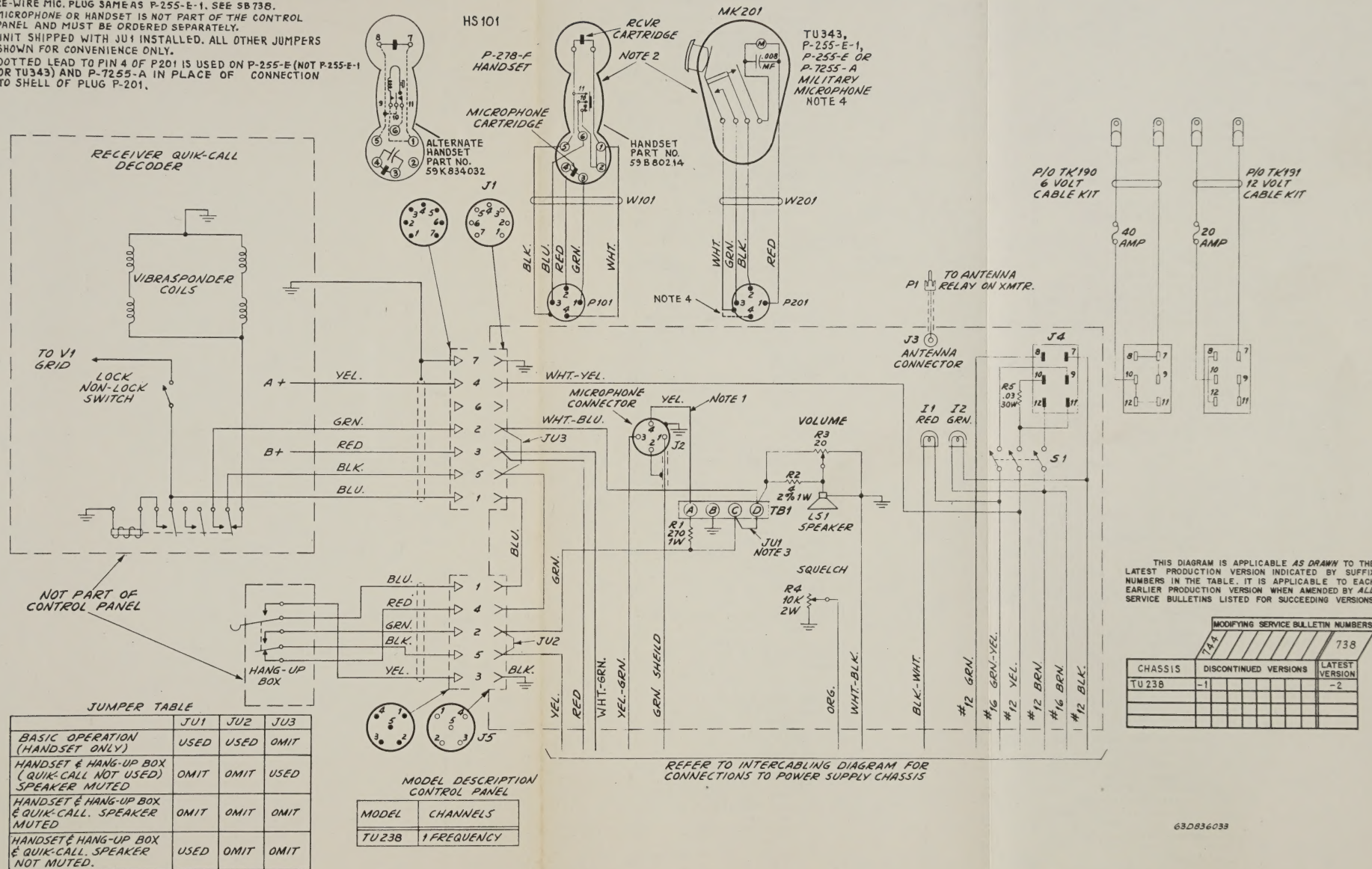
b. TU343 Military Microphone
P-7255-A Military Microphone (Noise Cancelling)

MK 201	50K844801 or 1V475678	<u>MICROPHONE,</u> Carbon: push-to-talk switch; Military type; includes reference parts P 201 and W 201 (30B822726) (Used only for Model TU343)
		<u>MICROPHONE AND CONNECTOR ASSEMBLY,</u> Includes: 59B475596 MICROPHONE, carbon: single button; Military type; push-to-talk switch, includes reference parts W 201 (Assembly used only for Model P-7255-A)
P 201	28A16370	<u>CONNECTOR,</u> Plug: male; 4 contact; polarized; cylindrical; cable mounted; p/o MK 201
W 201	30B84269 or 30B822726	<u>CORD,</u> Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord are stripped only; p/o MK 201 (59B475596) used only in Model P-7255-A Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord stripped only; p/o MK 201 (50K844801) Used only in Model TU343

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
NON-REFERENCED PARTS LIST		
	1V16241	<u>MICROPHONE MOUNTING PARTS KIT,</u> Supplied with Models TU343 and P-7255-A; includes: 64A85596 PLATE, support 3S8101 SCREW, tapping: 8-15 x 1/2"; 2 supplied
	51B83300	<u>PHONE HANGER ASSEMBLY,</u> Supplied with Model P-278-F; requires 1V83301 MOUNTING PARTS KIT
	1V83301	<u>PHONE HANGER MOUNTING PARTS KIT,</u> Supplied with Model P-278-F; used with 51B83300 PHONE HANGER ASSEMBLY; includes: 64A83334 PLATE, reinforcing 3S7453 SCREW, tapping: #8 x 1"; 2 supplied 3S6943 SCREW, machine: 8-32 x 1-1/4"; 2 supplied 4S8411 LOCKWASHER, internal: #8; 2 supplied
	60K890184 60K890588	<u>LENS,</u> Indicator light: RED Indicator light: GREEN

NOTES:

1. YEL. LEAD CONNECTION AT TB1 DEPENDS UPON HANDSET USED. FOR ALL HANDSETS, TU343 AND P-255-E-1 MIL. MICS. CONNECTION IS CORRECT AS SHOWN (AS SHIPPED FROM FACTORY). FOR P-255-E OR P-7255-A MOVE YEL. LEAD TO TERM. B OR RE-WIRE MIC. PLUG SAME AS P-255-E-1. SEE SB 738.
2. MICROPHONE OR HANDSET IS NOT PART OF THE CONTROL PANEL AND MUST BE ORDERED SEPARATELY.
3. UNIT SHIPPED WITH JU1 INSTALLED. ALL OTHER JUMPERS SHOWN FOR CONVENIENCE ONLY.
4. DOTTED LEAD TO PIN 4 OF P201 IS USED ON P-255-E (NOT P-255-E-1 OR TU343) AND P-7255-A IN PLACE OF CONNECTION TO SHELL OF PLUG P-201.

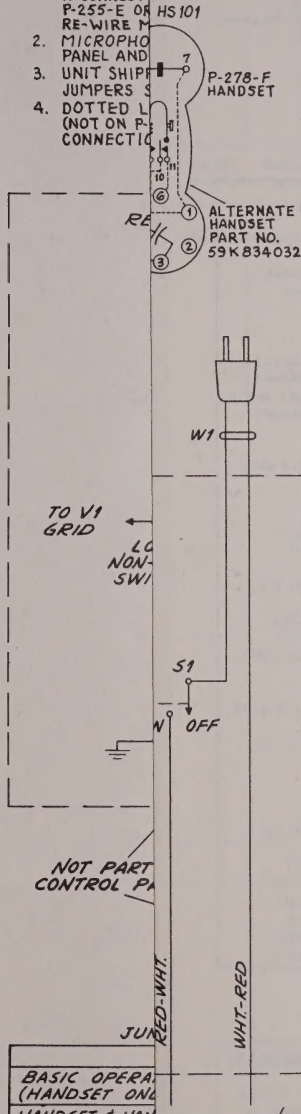


63D836033

MOTOROLA PART No.	DESCRIPTION
60K890184 60K890588	<u>PHONE HANGER MOUNTING</u> <u>PARTS KIT,</u> 458411 LOCKWASHER, internal: #8; 2 supplied
	<u>LENS,</u> Indicator light: RED Indicator light: GREEN

NOTES:

1. YEL. LEAD ()
IS CORRECT
P-255-E OR
RE-WIRE M
2. MICROPHO
PANEL AND
3. UNIT SHIP
JUMPERS S
4. DOTTED L
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CONTROL PA

THIS DIAGRAM IS APPLICABLE AS DRAWN TO THE LATEST PRODUCTION VERSION INDICATED BY SUFFIX NUMBERS IN THE TABLE. IT IS APPLICABLE TO EACH EARLIER PRODUCTION VERSION WHEN AMENDED BY ALL SERVICE BULLETINS LISTED FOR SUCCEEDING VERSIONS.

MODIFYING SERVICE BULLETIN NUMBERS									
635	744								738
CHASSIS	DISCONTINUED VERSIONS								LATEST VERSION
TU239	*-1								-2

* EFFECTIVE BEGINNING OF PRODUCTION.

BASIC OPERA
(HANDSET ON)
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(QUIK-CALL NO
SPEAKER MUT
HANDSET & HAN
& QUIK-CALL. SA
MUTED
HANDSET & HAN
& QUIK-CALL. SA
NOT MUTED.

63D836034

Schematic Diagram Parts List

Reference:
Schematic Diagram
63D836033

1. TU238 DC Control Panel with
Microphone Connector

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
I 1	65X4151	<u>LAMPS,</u> Incandescent: round; bayonet; clear; type #51; wht lead; 2 amp
I 2		Same as I 1
J 1	9R119817	<u>CONNECTORS,</u> Receptacle: female; 7 contact
J 2	9B16345	Receptacle: female; 4 contact
J 3	9A85615	Receptacle: female; single contact
J 4	28B834755	Receptacle: male; 6 contact
J 5	9A802761	Receptacle: female; 5 contact
LS 1	50C800112	<u>SPEAKER,</u> PM: 4 inch; voice coil 3.2 ohm; output 1.5 W
P 1	28K474006	<u>CONNECTOR,</u> Plug: male; single contact
R 1	6R6336	<u>RESISTORS,</u> Fixed: carbon; 270 ±10%; 1 W; ins.
R 2	17K892469	Fixed: wire-wound; 4 ±2%; 1 W ins.
R 3	18K838263	Variable: wire-wound; 20 ±20%; 2 W
R 4	18C890193	Variable: wire-wound; 10K ±10%; 2 W
R 5	17B834750	Fixed: wire-wound; .03 ±10%; 30 W; ins.
S 1	40B834757	<u>SWITCH,</u> Toggle: S.P.S.T.
XI 1	60A890181	<u>INDICATORS,</u> Light: bayonet base; single contact incl. red jewel
XI 2	60K89049	Light: bayonet base; single contact incl. green jewel

2. Optional Accessories

a. P-278-F Handset Microphone

HS 101	1V84353	<u>HANDSET AND CABLE ASSEMBLY,</u> Consisting of: 59B80214 HANDSET: carbon; transmitter cartridge, 30 ohm; receiver cartridge 137 ohm at 1000 cycle or 59K834032 HANDSET: carbon; transmitter cartridge 30 ohm; receiver cartridge 137 ohm at 1000 cycle Includes reference part W 101
P 101	28A16370	<u>CONNECTOR,</u> Plug: male; 4 contact; polarized; cylindrical; cable mounted; p/o W 101

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
W 101	1V84354	<u>HANDSET CABLE ASSEMBLY,</u> Includes: 30K84270 CORD, handset: coiled; 5 conductor; conductors color coded; BLACK, WHITE, RED, GREEN, BLUE; both ends of cord are stripped only Includes reference part P 101

b. TU343 Military Microphone
P-7255-A Military Microphone (Noise Cancelling)

MK 201	50K844801	<u>MICROPHONE,</u> Carbon: push-to-talk switch; Military type; includes reference parts P 201 and W 201 (30B822726) (Used only for Model TU343)
	or 1V475678	<u>MICROPHONE AND CONNECTOR ASSEMBLY,</u> Includes: 59B475596 MICROPHONE, carbon: single button; Military type; push-to-talk switch, includes reference parts W 201 (Assembly used only for Model P-7255-A)
P 201	28A16370	<u>CONNECTOR,</u> Plug: male; 4 contact; polarized; cylindrical; cable mounted; p/o MK 201
W 201	30B84269	<u>CORD,</u> Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord are stripped only; p/o MK 201 (59B475596) used only in Model P-7255-A
	or 30B822726	Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord stripped only; p/o MK 201 (50K844801) Used only in Model TU343

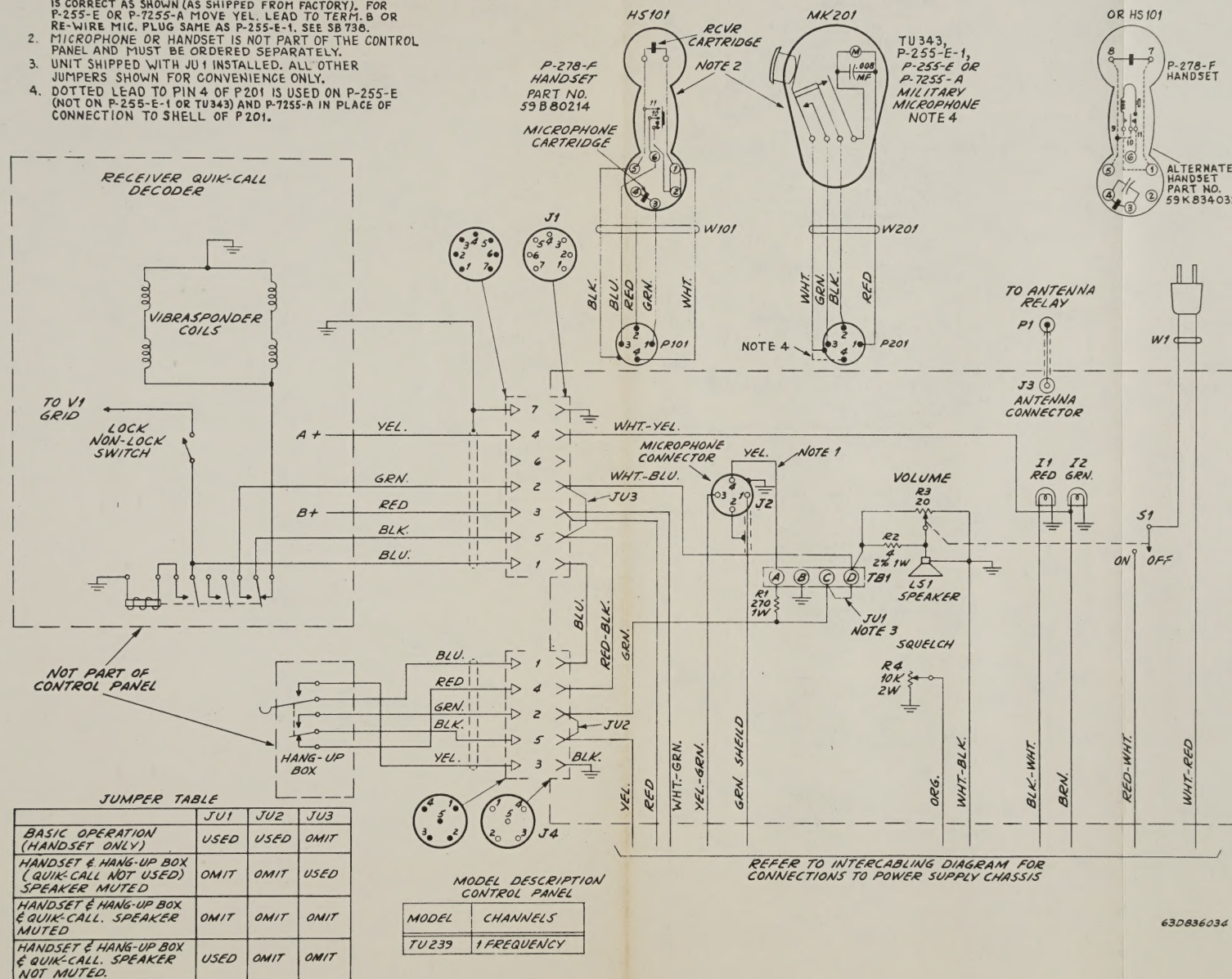
NON-REFERENCED PARTS LIST

	1V16241	<u>MICROPHONE MOUNTING PARTS KIT</u> Supplied with Models TU343 and P-7255-A; includes: 64A85596 PLATE, support 3S8101 SCREW, tapping: 8-15 x 1/2"; 2 supplied
	51B83300	<u>PHONE HANGER ASSEMBLY</u> Supplied with Model P-278-F; requires 1V83301 MOUNTING PARTS KIT
	1V83301	<u>PHONE HANGER MOUNTING PARTS KIT,</u> Supplied with Model P-278-F; used with 51B83300 PHONE HANGER ASSEMBLY; includes: 64A83334 PLATE, reinforcing 3S7453 SCREW, tapping: #8 x 1"; 2 supplied 3S6943 SCREW, machine: 8-32 x 1-1/4"; 2 supplied

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
	60K890184 60K890588	<u>PHONE HANGER MOUNTING PARTS KIT,</u> 458411 LOCKWASHER, internal: #8; 2 supplied <u>LENS,</u> Indicator light: RED Indicator light: GREEN

NOTES:

1. YEL. LEAD CONNECTION AT TB1 DEPENDS UPON MIC. (OR HANDSET) USED. FOR ALL HANDSETS, TU343 AND P-255-E-1 MIL. MICS, CONNECTION IS CORRECT AS SHOWN (AS SHIPPED FROM FACTORY). FOR P-255-E OR P-7255-A MOVE YEL. LEAD TO TERM. B OR RE-WIRE MIC. PLUG SAME AS P-255-E-1. SEE SB 738.
2. MICROPHONE OR HANDSET IS NOT PART OF THE CONTROL PANEL AND MUST BE ORDERED SEPARATELY.
3. UNIT SHIPPED WITH J11 INSTALLED. ALL OTHER JUMPERS SHOWN FOR CONVENIENCE ONLY.
4. DOTTED LEAD TO PIN 4 OF P201 IS USED ON P-255-E (NOT ON P-255-E-1 OR TU343) AND P-7255-A IN PLACE OF CONNECTION TO SHELL OF P201.



THIS DIAGRAM IS APPLICABLE AS DRAWN TO THE LATEST PRODUCTION VERSION INDICATED BY SUFFIX NUMBERS IN THE TABLE. IT IS APPLICABLE TO EACH EARLIER PRODUCTION VERSION WHEN AMENDED BY ALL SERVICE BULLETINS LISTED FOR SUCCEEDING VERSIONS.

MODIFYING SERVICE BULLETIN NUMBERS			
635	744		738
CHASSIS	DISCONTINUED VERSIONS	LATEST VERSION	
TU239	*-1		-2

* EFFECTIVE BEGINNING OF PRODUCTION.

63D836034

MOTOROLA PART No.	DESCRIPTION
	<u>PHONE HANGER MOUNTING</u> <u>PARTS KIT,</u> 458411 LOCKWASHER, internal: #8; 2 supplied
60K890184	<u>LENS,</u> Indicator light: RED
60K890588	Indicator light: GREEN

SCHEMATIC DIAGRAM PARTS LIST

Reference:
Schematic Diagram
63D836034

1. TU239 Control Panel with
Microphone Connector

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
I 1	65X4151	<u>LAMPS,</u> Incandescent; round; bayonet; clear; type #51; .2 amp
I 2		Same as I 1
J 1	9R119817	<u>CONNECTORS,</u> Receptacle; female; 7 contact
J 2	9B16345	Receptacle; female; 4 contact
J 3	9A85615	Receptacle; female; single contact
J 4	9A802761	Receptacle; female; 5 contact
LS 1	50C800112	<u>SPEAKER,</u> PM: 4 inch; voice coil 3.2 ohm; output 1.5 W
P 1	28K474006	<u>CONNECTOR,</u> Plug; male; single contact
R 1	6R6336	<u>RESISTORS,</u> Fixed; carbon; 270 $\pm 10\%$; 1 W; ins.
R 2	17K892469	Fixed; wire-wound; 4 $\pm 2\%$; 1 W; ins.
R 3	18K838283	Variable; wire-wound; 20 $\pm 10\%$; 2 W; incl. S. P. S. T. switch, S 1
R 4	18C890193	Variable; wire-wound; 10K $\pm 10\%$; 2 W
S 1		<u>SWITCH,</u> S. P. S. T.: p/o R 3
W 1	30B892534	<u>CABLE,</u> A. C.: 2 conductor; 10 ft. lg; incl. plug
XI 1	60A890181	<u>INDICATORS,</u> Light; bayonet base; single contact incl. red jewel
XI 2	60K890479	Light; bayonet base; single contact incl. green jewel

2. Optional Accessories

a. P-278-F Handset Microphone

HS 101	1V84353	<u>HANDSET AND CABLE ASSEMBLY,</u> Consisting of: 59B80214 HANDSET: carbon; transmitter cartridge, 30 ohm; receiver cartridge 137 ohm at 1000 cycle or 59K834032 HANDSET: carbon; transmitter cartridge 30 ohm; receiver cartridge 137 ohm at 1000 cycle Includes reference part W 101
P 101	28A16370	<u>CONNECTOR,</u> Plug; male; 4 contact; polarized; cylindrical; cable mounted; p/o W 101

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
W 101	1V84354	<u>HANDSET CABLE ASSEMBLY,</u> Includes: 30K84270 CORD, handset: coiled; 5 conductor; conductors color coded; BLACK, WHITE, RED, GREEN, BLUE; both ends of cord are stripped only Includes reference part P 101

b. TU343 Military Microphone
P-7255-A Military Microphone (Noise Cancelling)

MK 201	50K844801	<u>MICROPHONE,</u> Carbon; push-to-talk switch; Military type; includes reference parts P 201 and W 201 (30B822726) (Used only for Model TU343)
	or 1V475678	<u>MICROPHONE AND CONNECTOR ASSEMBLY,</u> Includes: 59B475596 MICROPHONE, carbon; single button; Military type; push-to-talk switch; includes reference part W 201 (Assembly used only for Model P-7255-A)
P 201	28A16370	<u>CONNECTOR,</u> Plug; male; 4 contact; polarized; cylindrical; cable mounted; p/o MK 201
W 201	30B84269	<u>CORD,</u> Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord are stripped only; p/o MK 201 (59B475596) used only in Model P-7255-A
	or 30B822726	Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord stripped only; p/o MK 201 (50K844801) Used only in Model TU343

NON-REFERENCED PARTS LIST

	1V16241	<u>MICROPHONE MOUNTING PARTS KIT,</u> Supplied with Models TU343 and P-7255-A; includes: 64A85596 PLATE, support 3S8101 SCREW, tapping: 8-15 x 1/2"; 2 supplied
	51B83300	<u>PHONE HANGER ASSEMBLY,</u> Supplied with Model P-278-F; requires 1V83301 MOUNTING PARTS KIT
	1V83301	<u>PHONE HANGER MOUNTING PARTS KIT,</u> Supplied with Model P-278-F; used with 51B83300 PHONE HANGER ASSEMBLY; includes: 64A83334 PLATE, reinforcing 3S7453 SCREW, tapping: #8 x 1"; 2 supplied 3S6943 SCREW, machine: 8-32 x 1-1/4"; 2 supplied

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		<u>PHONE HANGER MOUNTING PARTS KIT,</u> 4S8411 LOCKWASHER, internal; #8; 2 supplied
		<u>LENS,</u> Indicator light: RED Indicator light: GREEN
	60K890184 60K890588	

